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MARSHALL Andrews

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Andrew Marshall, M.D.

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THE

MORBID ANATOMY

OF THE

BRAIN,

IN

MANIA AND HYDROPHOBIA;

WITH THE

PATHOLOGY OF THESE TWO DISEASES,

AS COLLECTED FROM THE PAPERS

OF THE LATE

ANDREW MARSHAL, M.D.

MANY YEARS TEACHER OF ANATOMY IN LONDON;

WITH

AN ACCOUNT OF SOME EXPERIMENTS,

TO ASCERTAIN

WHETHER THE PERICARDIUM AND VENTRICLES OF THE BRAIN CONTAIN WATER IN A STATE OF HEALTH:

TO WHICH IS PREFIXED,

A Sketch of his Life.

By S. SAWREY,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS,

FORMERLY ASSISTANT LECTURER TO DR. MARSHAL.

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DEDICATION.

TO THE PUPILS OF THE LATE DR. MARSHAL.

GENTLEMEN,

I AM induced to dedicate the present work to you on several considerations. I know that it would have been most congenial to the ideas of our departed friend and preceptor, who always felt an affectionate attachment and anxiety for those whom he had instructed. Many of you are at present among the most eminent and honorable of the profession; and are fully competent to appretiate the value of his facts and observations. Many of you also can bear witness to the correctness of some of the dates mentioned, and to the opinions he had formed, and was desirous of disseminating.

DEDICATION.

Having had the honor of being a fellow-labourer with many of you, at his anatomical tables, it is a great gratification to me to take this opportunity of renewing our mutual remembrance; of regretting with you the loss of our common friend and instructor; and of expressing our unabated affection for his memory, and zeal for his just fame. Allow me to subscribe myself,

Gentlemen,

With great esteem and regard,

Your faithful friend, and

Humble Servant,

S. SAWREY.

Chancery Lane,
November 22nd, 1814.

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EDITOR'S PREFACE.

In laying before the public the observations and opinions of a man so much revered by his friends and pupils as the late Dr. Marshal, the Editor has obeyed not only the impulse of his own feelings, but has also fulfilled the wishes of his departed friend. It was the Author's request on his death-bed that his papers should be committed to the Editor's care, to be published, or otherwise, as he approved of them. No restriction was imposed, nor any further observation made, excepting that Dr. M. was pleased to add, that he was sure they would not be improperly used.

The Editor has endeavoured to execute the task entrusted to him with a due recollection of this accompanying intimation, and for the first publication has selected such parts of the Author's MSS. as were in a state the most prepared for publication.

The Editor first became acquainted with Dr. Marshal by attending his lectures, in 1794. By a dissection of the nerves of the eye, he had the good fortune to attract Dr. Marshal's notice, who requested his assistance in preparing this delicate part of our system for demonstration to his pupils. A confidential professional intercourse arose from this period, and Dr. Marshal took great pleasure in communicating his observations and opinions to the Editor, and finally entrusted his MSS. to his care.

Dr. Marshal's papers contain a great mass of interesting matter upon various subjects,

but without any arrangement or preparation for the press. His mind always revolving professional subjects, he was perpetually committing his thoughts to paper as they arose; but could never be persuaded to put them into a state fit to be published.

He had formed many new and interesting opinions upon different subjects connected with his profession; and as he frequently mentioned them in conversation and in his lectures, many of them, from time to time, got abroad, and have been adopted, in the medical world, without either recollection or knowledge of their original author. Of late years the Editor strongly urged him to apply himself to publish his opinions in a connected form, for the preservation of his own merited reputation. But his answer usually was,—"I have published many of them in my lectures; my pupils and you will do me justice."

During his last illness, he had it in contemplation to dispose of his valuable anatomical museum—the result of many years labour. He desired the Editor to assist him in making out the catalogue; and requested him to introduce into it a short epitome of his peculiar opinions, in such places as the nature of the preparation suggested. It is to be lamented, that this catalogue was not completed under his inspection. It was begun; but his disease increasing, he could not bear the fatigue of hearing it read, and his death precluded the further progress of the plan.

The following work is divided into four Parts. The First is a discussion of a physiological opinion, whether water is contained in the healthy pericardium and ventricles of the brain.

Upon this subject Dr. Marshal's opinion

was new; and as he had made a number of experiments upon it, and as, in the account of the dissections, which are somewhat numerous, in the following pages, he always considers water in these cavities as an evidence of disease,—the Editor thought it necessary to premise the result of these experiments, with the Author's general conclusion.

The Second Part contains a history of two cases of hydrophobia; with an account of the appearances upon dissection; together with Dr. M.'s observations upon the nature of the disease. The Editor thought the manner in which the cases are recorded novel, and though it might excite criticism, still that it conveyed to the mind new ideas of the disease. The dissections are careful and accurate, and the chain of reasoning employed, cannot but lead to safe experiment. The Editor cannot but call it expe-

riment, as all our endeavours to cure this complaint, have hitherto not succeeded in subduing this dreadful malady. All this appeared too important not to come before the public eye.

The Third Part is upon the morbid anatomy of mania. The cases, which were selected from a variety of others, appear to be sufficient to establish the opinion of the seat of the disease being in the brain, and its generally producing disorganization in that organ. They also supply us with reasons to account for the frequent want of success, in the cure of this disease, among the most eminent in the profession.

The Fourth and last Part of the work is upon the nature of mania; but by way of illustrating, or introducing, the Author's ideas upon this highly interesting subject, the

Editor has premised a short sketch of the Author's opinion upon the functions of the brain and nerves.

The Editor is sensible of the difficulty of the subjects here discussed; but feeling the great force and admirable train of reasoning employed, and the ideas being many of them new, he could not resist the desire to bring them forward. Though further experiment may be wanting to establish them, and though many will yet maintain a contrary doctrine, still, it is hoped, the discussion will be advantageous on whatever side the truth lies: —whoever reasonably and physiologically excites a discussion which may tend to establish the wished-for end, deserves, in some degree, the thanks of the community.

The theory of mania comes next under consideration. Although the Author's dissections are sufficient to make us despair of

curing the malady in its later stages, yet his theory would encourage us to hope for success in the more early ones, before disorganization takes place ; and the Editor hopes it is such as may probably lay the foundation of a more rational and successful practice than has hitherto been adopted

CONTENTS.

Page

DEDICATION
Preface
Sketch of the Life of Dr. Marshal..... i.

PART. I.

THAT WATER IN THE PERICARDIUM AND VENTRICLES OF THE BRAIN IS AN EFFECT AND EVIDENCE OF DISEASE.

CHAP. I.

State of the preceding Opinions 1

CHAP. II.

Dr. Marshal's Experiments and Opinion..... 5

CHAP. III.

Water found in the Pericardium of drowned Animals.. 14

PART. II.

ON CANINE MADNESS.

CHAP. I.

Introduction 19

Page

CHAP. II.

Case of Hydrophobia in a Boy 24

CHAP. III.

Case of Hydrophobia in a young Woman 52

CHAP. IV.

Comparative View of the Two Cases 72

CHAP. V.

Appearances of the internal Parts after Death 92

CHAP. VI.

Pathology of Hydrophobia 104

APPENDIX TO PART II.

Introduction 123

CHAP. I.

History of Seven Children bitten by one mad Dog, on the 28th of August, 1808 125

CHAP. II.

Case of Hydrophobia and Dissection 129

PART III.

MORBID ANATOMY OF THE BRAIN IN MANIA.

Introduction 146

CHAP. I.

Cases and Dissections where the Head alone was examined 149

CONTENTS.

Page

CHAP. II.

Cases and Dissections where the Head, Heart, and Arteries were examined 184

PART IV.

OBSERVATIONS ON THE NATURE OF MANIA.

Introduction 206

CHAP. I.

Observations on the Functions of the Brain and Nerves 209

CHAP. II.

On the proximate Cause of Mania 263

CHAP. III.

Marks of Disease not always apparent in the Brains of Maniacs after Death 274

CHAP. IV.

On the predisponent and exciting Causes of Mania 280

CHAP. V.

On the Varieties of Mania 283

CHAP. VI.

On the maniacal Character, Deportment, and Ravings 292

A

SKETCH

OF THE

LIFE OF DR. MARSHAL.

THE Life of Dr. Marshal does not present any of those incidents which give interest to biography. It had no romantic adventures; nor was it chequered by any singular misfortune; it was the life of a man of original genius, emerging, unassisted, from his native obscurity, quietly and unostentatiously maturing himself by studies and meditations unknown to the world: long hesitating in the choice of a profession; beginning late, but pursuing it, when decided upon, with all that force of mind and enthusiasm which make difficulties but the means of increased progress. At all times rather shrinking and secluding himself from public notice, than ambitious of notoriety, and yet calmly and steadily advancing to knowledge and reputation; so that

he was enabled to meet the decline of life with a competence satisfying all his wishes, and with high professional respectability.

Dr. Marshal was born at Park Hill, in Fifeshire, in the year 1742. His father, John Marshal, was a farmer, with a numerous family, living on the side of the Tay, near Newburgh, under the Earl of Rothes. He was placed early with his maternal grandfather, who was also a farmer, and was there brought up, and taught to read.

When he was eight years old he was taken home by his parents, and placed at Mr. Taylor's school at Newburgh, where he was taught to write, and the rudiments of the Latin tongue. At ten he was sent to Abernethy school with his brother and sisters. It was then the most celebrated place of education for the Scotch seceders, of which description of dissenters his parents were.

Here, he says, in some biographical memoranda that were found among his papers, "I recollect my being reputed a quick and apt scholar; my regularly going to meeting every Sunday, and being very much pleased with the vehement sallies of Mr. Moncrief in the pulpit."

It will probably be most interesting to those who love the natural and artless effusions of the human mind, to read his own account of the first periods of his life. The following paragraphs are therefore given in his own words; the more interesting as they were not written by him with any view to their publication. They are the private minutes of those recollections which an intelligent mind loves to take of its early sensations.

" Merely from seeing the flocks and herds of my father, and the beautiful scenes of a rural life and business, I remember to have said in a moment that I would be a farmer, and give up school. My father immediately complied with my wish, but as I was only 14 he sent me a winter more to school to learn arithmetic. I deceived myself in this too, for I learned very little. My old Latin-master was dead; a new one had succeeded, but his method was not the best.

" I returned home from Abernethy, and soon began to be a young farmer, working, ordering, &c. I took an infinite interest in some of the individuals of our cattle. I had great pleasure in seeing the mare and foal put on good grass, and the calves well fed, &c. But my father being obliged to give up his goods, from misfortune, when I was about 16, I became tired of farming,

hurt at the disaster I saw befalling my father's interest.

" I resumed the study of Latin, and applied to it with some attention, being resolved to be a seceding minister; and feeling myself gifted in the ability of saying grace and prayer.

" I studied Latin again in Mr. Buchanan's school in Cairny-hill, and went thence to be examined at Culfargie and to be passed as a student of philosophy at Abernethy. I passed and studied logic there under Mr. Pine. The logic was an old MSS. of St. Andrew's system. I learnt every word of it by heart, and became master of genus, species, syllogism, &c. I received more benefit from this winter than I have ever done from any other learning.

" There was another examination for students of divinity at Alloa. The first examination was in Latin, in Virgil, Book II. of the Æneid; the next was in practical religion. I gave an account of my conversion.

" About this time I taught school at Lime-kilns. I was charmed with the romantic scenes of nature, and was always enjoying them in solitude. I was ignorant how to get or how to keep money.

"About this time I wrote an Essay on Ambition, which was published in the R—— Magazine, and an Essay on Composition, published in the British Magazine. In this last I animadverted on an expression of a seceding minister—'O now we conclude.' For publishing this essay I was summoned to the synod at Edinburgh, and excommunicated. *

"All this time I was so struck with the appearances of Nature, that to get settled and provided for was a subject which never came into my head. I passed one year wandering along the banks of the Forth; another along those of the Tay; astonished at every new scene of the country; fond of reading; not perfect in the Latin, yet admiring its composition.

"Having been to Glasgow with my brother William, on his way to America, I returned, and was presented with a guinea at Greenock, from Mr. Simson, for pleasing him in prayer.

"I then formed a blind design to go to Glasgow, and to leave my father's and the Lime-kilns. There, with my sister Ann, I kept house,

* The Editor has taken some little pains to get these Essays, but has not been able to succeed.

and taught school; attended College, particularly Dr. Reid; and I studied Greek privately. I was introduced to Dr. W. who took little notice of me, but took my money. I also studied mathematics.

" After two years residence there I went by Dr. Reid's recommendation to be tutor to a family in Islay. Before I set out I had a fever in Glasgow. The symptoms were, great alteration in sense, weakness, sickness, and bad dreams. On my way to Islay I was struck with the appearance of the west coast. I was entertained by a highland laird. After being settled I became unaccountably hoarse, and much weakened. After the fever my complexion became unduly vivid.

" I was at Islay four years; little to do; striving to instruct unmanageable children. I was out of the world—nearly out of existence. I read some Latin by dictionary and grammar; read eight books of Livy, and wrote sonnets—Dear Rocks of Islay! Here I used to wander in solitude, admiring the ocean, the beach, and the islands scattered around.

" By this time I was not less than 25 years old. I left Islay, and was, as before, without any rational prospect of a better situation. I

went to Edinburgh with my pupil. I did my utmost to instruct him and to save his father's money. I carried him back in the summer.

"I returned and subsisted by reading Latin and Greek with the students, privately. I attended the physical classes from curiosity. In 1769 I attended Dr. H—, as a student of divinity, which was my profession at Glasgow too. I was of the Divinity Hall when I delivered two discourses,—both barren of knowledge. I gave also a discourse at the Divinity Hall of the Seceders. I got reputation at Edinburgh for Greek. I was irregularly studying new and difficult subjects; never engaging myself." ——

In 1770 we find him engaged in private correspondence with the present Dr. Young, who was afterwards appointed Professor of Greek in the University of Glasgow, on the Greek language. He was then 28 years old; and at this period he was thus esteemed by his literary friend:—

"Your correspondence, my dear Sir, will be extremely agreeable, and the more so as we shall converse without restraint or ceremony. You need not to have told me you can be faithful; I was convinced of that before. It is

written in large characters, not in your letter (for there the characters are but dwarful), but in your face, your actions, and I presume somewhere else, which it is often difficult now-a-days to see. I have no mind to turn panegyrist; it is but a poor trade; but therefore I say, gratis, you have that in you which I think I can love," &c.

The letter containing these passages is dated July 19, 1770, and is addressed to Mr. Marshall, Student, at Mrs. Martin's, in Lady Stair's Close, Lawn Mercat, Edinburgh.

From another letter of Dr. Young's, dated August of the same year, we have some intimation of Mr. Marshal's studies at that time.

"Your metaphysics upon time, place, associations, trees, ideas, and islands, have raised you several inches in my estimation. As far as I can judge, they are perfectly orthodox, and consonous to right reason. But to be serious, you have certainly gone the true way to work. There is no doubt but language has its principles, and the more any one understands of it the more reason he finds to be convinced that it is so. The terms 'caprice of language' flowed originally from a weak noddle. These very caprices have their

principles, and principles not incapable of investigation," &c.

Another contains a criticism on a Greek inscription by Mr. Marshal. Mr. M. at that time appears to have sent papers occasionally to the Scotch Magazine; to have been very inquisitive as to the origin and meanings of the Greek prepositions and pronouns, and to have been studying Homer with critical nicety.

Some passages of this correspondence imply that Mr. Marshal was studying trigonometry and the mathematics; and from one letter to him from Mr. J. Hunter, afterwards and now Professor of Humanity in the University of St. Andrew's, dated Monboddo, 5th September, 1773, it would seem that Marshal was seriously engaged in the investigation of philosophical grammar and of mathematical analysis and synthesis.

While he remained at Edinburgh he formed an acquaintance with Lord Balgonie, eldest son of the Earl of Leven and Melville, who took the benefit of his classical attainments to assist his own studies, and in 1774 invited Mr. Marshal to accompany him to the Continent. On this incident Marshal remarks in his memoranda—

"In 1774 I went abroad with Lord B———. I saw a good deal of the world; spoke French; studied politics and war; was well received in general, and made connections."—In March he was at Tours with his noble companion, where they appear to have remained some months, as in July 1774 his friend at Glasgow desires, if he should ever go to Paris, to inspect for him the ancient MSS. of Longinus, in the King's library.

On his return from the Continent, he appears to have fixed himself at Edinburgh again, with the increased reputation which foreign travel, and the improvement it occasions, usually produce.

After this period Mr. M. applied seriously to the study of medicine: he was thinking of it so early as July 1770; for, Dr. Young, in one of his friendly letters written at that time, implies that he was then attending to the subject—

"N. B. Καταπεπ[ω is, in Latin, decoquo. I suspect that you will introduce into the medical dictionary this phrase—'a decoction of rage;'" —alluding to a metaphor of Homer which he was quoting.

In 1776 Mr. Marshal took private lessons on botany, with another gentleman, now a respect-

able physician in London, from an assistant in Dr. Hope's public garden. This friend remarks of him at this time—"He took to the study with enthusiasm, and, in following it, used often to surprise his companion with the warmth of his expressions on the beauty of the plants and the wisdom of the structure." His powerful mind was never satisfied with the perception of the fact; it was always rising from the particular incidents of any science to its philosophy; from the fact to its principle. Hence we have heard him descant for half an hour on the philosophy of the construction of one of the bones of the feet: emphatically pointing out the wisdom of the contrivance.

In January 1777 he read two well argued and ingenious papers to a medical society at Edinburgh. The first in Latin, "De Natura caloris;" the other in English, "On the Formation of calculous Concretions in the Human Body."

It was in this year he came to London to study for his professional improvements. On this important direction of his life he merely remarks, in his own notes,—"I was enabled by favor of Mr. Campbell to study in London in 1777."

The anatomical theatre to which he attached himself was Dr. W. Hunter's, in Great Windmill Street, where Mr. J. Hunter lectured on surgery. While studying here, at the age of 32, his philological friend, Professor J. Hunter, wrote to him from St. Andrew's, in Nov. 1777, to inform him that the principal of that College had just died; that Dr. Watson was likely to succeed him, and that Dr. Watson's office, as Professor of Logic and Rhetoric, would in that case be vacant. He tells Mr. Marshal it was worth about £140 or £150 per annum; asks him if he would take the office; promises to strain every nerve for his interest, and points out the friends he must secure. But Mr. Marshal had now interested himself so earnestly in his medical studies, that he declined the object which his attentive friend recommended to his consideration.

He continued his studies at the anatomical theatre when Mr. Cruikshank also taught, in 1778, till he was appointed to be surgeon to the 83d regiment, by the interest of Lord Leven, father of Lord Balgonie.

After passing some time with the regiment in Scotland, he accompanied it to Jersey, where it was stationed for some years. In this situation

he had the comfort of being released from all anxiety on pecuniary subjects. Frugal both from taste and habits, founded on the early necessity of economy, his income was more than sufficient for his easy maintennace. He was now in a situation where his talents could exercise themselves, in utility to others, as well as procuring reputation to himself.*

The rigid probity, which was at all times a

* The following certificate he obtained of his professional competency before the appointment to the regiment:

"*Edinburgh, 6th February*, 1778.

"This is to certify,

"That Mr. Marshal, after having had a most ample education in classical learning, philosophy, and in every branch of physic, in this University, acted under us in the Royal Infirmary at Edinburgh, as our clerk or assistant; in which situation he had great opportunities of seeing an extensive practice, and giving us daily the fullest proofs of his diligence, skill, and abilities.

"And that we think him extremely well qualified for officiating as surgeon either in the army or navy; few having had like opportunities, or improved them with more advantage.

"John Stedman,
"John Hope,
"James Hamilton,
} Physicians to the Royal Infirmary at Edinburgh.

"James Gregory, Clinical Professor, and Professor of the Institution of Medicine in the University of Edinburgh."

predominant feature in his character, made him zealous in the discharge of his duty, and converted its fatigues into a gratification. This appears to have sometimes involved him in discussions with his regimental superiors; but his integrity was rewarded with proper triumph. He thus mentions the circumstance in his notes.

"I was indefatigable in arranging my hospital—saving the men and curing them—did operations in Jersey—got character as a surgeon—waged war with the commanding officers, and others—prevailed—was consulted in all bad cases in Guernsey—intent only on my duty, neglected person."

His success in the regiment was distinguished, for out of 1000 young soldiers, who were under his care, in the course of four years only twelve died from disease.*

* Major-General Scott's certificate will be the best panegyric on Mr. Marshal, for his regimental services. It is as follows:

"It is hereby certified, That Mr. Andrew Marshall, M. D. was appointed surgeon to the late 83d regiment of foot, under my command, at the raising of the said regiment, untill its reduction, being upwards of five years: that during of the whole of the time he was with the regiment he was perfectly

In 1782 he was desirous of obtaining the degree of Doctor of Medicine from the University of Edinburgh: for this purpose he wrote an inaugural dissertation in Latin, "De tuenda salute Militum," which he dedicated to David Earl of Leven and Melville, and to his friend Patrick Miller, Esq. with warm, but discriminating encomium.

The object of this essay was to state his ideas of the best means of preserving the health of the military. It turns principally on their diet. He notices the importance of vegetable food;

attentive to every part of his duty: that the regiment was fully sensible of the care that was shewn to the soldiers, in every respect: and that in consequence of Mr. Marshall's skill and attention, the general returns of the sick were a proof of his abilities, from the small portion of sick men that appeared in these returns.

"That besides the practice he had with the regiment, Mr. Marshall was frequently called on by the first people in Guernsey and Jersey (and as one instance of his skill, he extracted a cataract from the eye of a person in Jersey, with perfect success): and that in all cases he was consulted upon he gave perfect satisfaction to his employers.

It gives me great satisfaction to give Mr. Marshall this testimony of my approbation; and I hope his future success will meet with the encouragement I think his knowledge in this profession as a physician deserves.

"Geo. Scott, Major-General."

mentions the articles of which it should consist; enforces the great consequence to their health of bread well made and well baked; gives some useful minute directions which his experience had suggested; discusses the article of animal food; states the great advantage of soups and good meat to the soldiers wearied with marching, often without sleep, and in rain and cold; enters into directions for preserving and salting their animal food; and closes his dissertation with some remarks on their most salubrious drinks. At the end he pays some compliments to Dr. Cullen, Dr. Stedman, Dr. Hope; to the "optimum et ornatissimum juvenem, cujus amicitia ex longo tempore mihi fuit ornamento," David Pitcarn, one of the physicians to St. Bartholomew's Hospital; also to Mr. Cruikshank and Mr. J. Hunter. As he had an unfortunate difference afterwards with this last mentioned gentleman, it is with pleasure that we add the laudatory passage in a note, to shew that Dr. Marshal really felt, and had publickly acknowledged his unquestionable merit.*

* "Plurimum quoque debui viro illustrissimo Joanni Hunter, chirurgo regis extraordinario. Post auditas ejus praelectiones, tum chirurgia visa est disciplina rationalis quum ad aegros Sti. Georgii sub illo attenderem, famæ facile credidi, illum non minus manu, quam ratione præcellere. Admirationem nequivi supprimere tanti auctoris naturæ, et veri."

Mr. Marshal was on this admitted to graduate at the University of Edinburgh, the 12th of September, 1782.*

After the peace in 1783, the regiment was disbanded. On this event he remarks, "In April 1783 came to London, thinking I had many friends. Dr. David Pitcairn advised me to settle in London, and to lecture at the Hospital, promising his support and patronage; upon which I fixed myself near the Hospital. The Doctor's friendliness was ardent the first year; visiting me, bringing me diseased parts, and recommending me. I assisted him in preparing for his examinations before the College, by reading authors with him, and clearing up several difficulties. I had the warmest esteem for him. I praised him in the Thesis, and wherever I went."

* His diploma bears this date, and is signed by

Dr. Black	Dr. W. Robertson
Dr. Cullen	Dr. R. Hamilton
Dr. Hope	Dr. Cuming
Dr. A. Munro	Dr. Pringle
Dr. Gregory	Dr. J. Robertson
Dr. Young	Dr. Ferguson
Dr. Home	Dr. Hugh Blair
Dr. Hamilton	Dr. Robison.

From these notes it would appear, that the idea of Dr. Marshal's settling in London to practice, and of his lecturing, arose from the suggestion of Dr. D. Pitcairn. We regret to observe, that this gentleman's friendship is noticed to have declined in the summer of 1785, but his sanction to Dr. Marshal, even during the first year of his settling in London, must always be considered to have been advantageous to the Doctor, by all who recollect the importance of every aid to a physician, at his first appearing.

Dr. D. Pitcairn's first project was, that Dr Marshal should lecture to the pupils of St. Bartholomew's Hospital, in one branch of the studies there, while Dr. D. Pitcairn, and two other physicians, should pursue the rest. But out of delicacy to the patients of the hospital it was wished that the lectures on anatomy should be at some place out of the hospital. Dr. D. Pitcarn did not lecture as was intended.

It is well known to all Dr. Marshal's friends that the abandonment of the scheme of forming a kind of school of physic and surgery for the pupils of the hospital, as first suggested by Dr. Pitcairn, was a severe disappointment, which he never forgot: he thought himself forsaken by the friends on whom he had most depended—

he had now only his own exertions to depend on, and though he might succeed in his future struggle for reputation, it was likely to be a severe one.

We will not revive medical feuds by discussing the cause of the change of plan. Dr. Marshal certainly imputed it to Dr. D. Pitcairns' now perceiving that if he established a respectable lecture at St. Bartholomew's, it might interfere with his friend Mr. Hunter's academy in Great Windmill-street. We cannot now ascertain the real state of the case, therefore we would prefer passing over it in silence, that no animosity may be revived.*

Dr. Marshal seems to have hesitated at first

* In a friendly letter, about this peried, the celebrated Dr. J. Gregory thus speaks of Dr. Marshal's lecturing :— "After so many years as I know you have employed in the study of physic and surgery, I can scarce think you can at present need much preparation to enable you to give a course of lectures that may do you credit. If you really, on mature deliberation, find you cannot get ready lectures that may please yourself, I confess I should think it better to postpone the attempt for a twelvemonth, that you may be ὁππαρασκευαστοτατος. For though I have a very good opinion of your knowledge and of your patience, in many respects, I should not much rely on your impudence or extempore effusions, to save your credit on many occasions, where you were obliged to hold forth without being duly prepared."

about practising as a physician; at least in 1784 he thought proper to conceal his Edinburgh degree, and applied to the College of Surgeons in London to be admitted to practice as a surgeon. His admission to the College of Surgeons is dated in January 1784. But in 1788 his mind was decided to practice as a physician; and in this year he was appointed a licentiate by the College of Physicians. His diploma bears date the 30th September, 1788.

Dr. Marshal belonged to a medical society formed by Dr. Fordyce and Mr. J. Hunter, and read a paper to it on fever, which was much approved of. This occasioned a further disagreement between him and Dr. D. Pitcairn. The latter erroneously fancied that it had been taken from Mr. J. Hunter's doctrine. Some angry observations passed on the subject; and Dr. Marshal's mind was considerably affected by hearing him express a wish, in a moment of warmth, that Dr. M. had not come to London.

Dr. M. provoked at the insinuation respecting the paper, sent the MS. of it to Mr. J. Hunter, who afterwards acknowledged that it was not taken from him.*

* It is with great pleasure we add Dr. Pitcairn's liberal

When Mr. J. Hunter wrote his celebrated work on the venereal disease, it was submitted to a committee of medical gentlemen for correction and revision. Dr. M. was one of this committee, and proposed many alterations in method, language, &c. Dr. Marshal says in his memoranda—

"Mr. Hunter himself attended at those meetings, at his own house; he called on me; left his card, requesting as many corrections as I could make. I spoke freely, but respectfully. I argued against specifics, and his partiality for improper indulgencies," &c.

When Mr. Hunter had printed his work, he sent a copy of it to Dr. Marshal, as one of the

and kind avowal, that he had been wrong in supposing the paper on fever to have been borrowed.

"It was with much satisfaction that I the other day learnt from Mr. Hunter that your account of fever was not taken from his doctrines. I did you wrong therefore in snspecting it. I acknowledge I did so, and I ask your pardon for it; I had no intention of affronting you by these suspicions; this I have already told you: if there was any thing offensive in the manner of doing it, you will do me a favour by pointing it out to me; and if I am sensible that it was offensive, will acknowledge it readily; if not, I will as readily give you any other satisfaction you may require. Your most obedient,

"David Pitcarn.'

committee, who returned his thanks, calling it "the best work which had appeared on the subject." Besides the corrections and alterations of the committee, this work had been revised by Sir George Baker; thus it appeared with all these improvements and advantages.

Dr. Marshal's anatomical school was in Thavies Inn, where he settled in 1785. He built a dissecting room there; and his reputation for knowledge and attention was so great, that he soon obtained a good class of pupils.

Some time after this, it was proposed by some mutual friends, that Dr. Marshal should allow Mr. Abernethy, then a rising and aspiring young man, to join him; to which intimation Dr. Marshal remarked,—"This will reduce me to a situation worse by half than that which was held out to me at first. I have embarked all my resources, and committed my reputation on this business, and by my industry I have attained some footing in it; and now I am to divide what is hardly enough when entire, and which I have laboured hard to enjoy entire." Thus considering it, no one will be surprised to find that Dr. Marshal declined the proposed partnership.

In April, 1789, a quarrel took place between Dr. Marshal and Mr. J. Hunter, which probably

influenced the rest of his life. Dr. M. read a paper before the medical society already mentioned, on hydrophobia, in which he observed, that he had found the brain diseased in two cases he had examined; and stated, generally, his opinion, that the brain was also materially affected in mania. This opinion was rudely attacked by Mr. Hunter, and the dispute ended in a personal quarrel. But to detail the circumstances of this unpleasing subject would be revealing the failings of two great and highly deserving men, both of whom the profession have many reasons to respect. We have therefore preferred to pass over the subject, as one that ought now to be forgotten.

We will only say, that Dr. Marshal considered himself to have been ill-treated, for having fairly endeavoured to advance the knowledge of his profession; and, with this feeling, we cannot wonder at his inference, that if he published other observations, different from the received opinions of his day, he should be only attacked and discredited again. He forgot indeed that all the profession was not of this disposition; that it abounds with liberal minds, and that men of original merit, though always looked on at first with suspicion, because not fully known, will inevitably emerge by perseverance. Dr. Mar-

shal, it is to be regretted, took alarm too soon; his proper pride would have been to have pursued his professional studies with new resolution and firmness; to have appealed freely to the public, when he felt conscious of deserving its attention; to have disregarded temporary criticism, which no man can escape, and no wise man will regard but as hints for his own improvement, and to have calmly awaited the certain effect of unquestionable talent.

Dr. Marshal continued his studies, but gave none of their results to the world, excepting through the medium of his lectures. He continued teaching anatomy, &c. until autumn, 1800, when he declined it on account of ill-health.*

* His pupils will be glad to read again his kind farewell observations and thanks, with which he took leave of them.

"*August 26th.* 1800.—Dr. Marshal finds that his health will not enable him to teach anatomy now in the ensuing season. The lectures, therefore, and practical anatomy in Bartlet-court, are discontinued.

"He cannot withdraw with indifference from the anatomical tables. If the absolutely inert passive nature of the lymphatics has been proved, those who have understood, and admitted the proofs, will defend and vindicate, and extend the doctrine; and though he should no more speak of the brain and nerves, he is confident, that medical men, will at last cease to ascribe primary powers, and the first energies in animal bodies, to the nervous system.

As he was a most minute anatomist, his dissections were highly valuable, and his practical anatomy and lectures were attended by gentlemen of the highest respectability. Much of his time in the morning was passed in the dissecting-room along with his pupils, dissecting and demonstrating such parts as they had prepared, or other opportunities offered. He observed, that the only way of becoming master of anatomy was by careful and much dissection; therefore, he strongly urged gentlemen to the practice. It was not until they had a competent knowledge of the subject, that he encouraged them to make anatomical preparations.

And although his lectures were not delivered with fluency, they were replete with important matter, minuteness, and system. His mathe-

"On this occasion, he cannot refrain from openly declaring his great and perpetual obligations to students of medicine, for the spontaneous study and effectual support they have given to the anatomy of Bartlet-court, during these 16 years past. He also begs leave to return thanks to those medical characters, who approving of his diligence, or from mere favour, have from first to the last given him their countenance."

Dr. Marshal's executors have a great number of letters in their possession, from medical men in the East and West Indies, America, and different parts of Europe, expressing their high obligations to him, for the instructions they had received.

matical knowledge enabled him to give a most accurate description of the bones and joints, and a new mechanical physiology, which at once showed the young mind the motions they were capable of, the easy and beautiful manner in which these motions are performed, the common effects of accidents, and the different kinds of laxations which take place in this part of our system.

The other parts of the body were demonstrated with the same precision, systematic order and connection :—so strict was he to that order, which his mind perceived to be necessary, that hardly any urgency would make him depart from it; observing, that less mischief resulted from a little delay, than from giving the subject in a disjoined manner to the pupil, which would require an effort of their minds, to make it up into a connected and dependent system, which he could not suppose them capable of. He justly remarked, that he could suppose it possible to give, even an accurate course of lectures on anatomy, in such an unconnected manner as to be of little or no use either to physiology or practice.

No part of anatomy, however minute, was considered by him of minor importance, or un-

worthy of the attention of the anatomist and practitioner. He observed, that frequent instances might occur in which this accurate knowledge would be of the greatest use to our fellow-creatures, and place the medical man who had acquired it far above the level of other practitioners. The whole of the subject was given with a constant reference to the infinite wisdom of the contrivance exhibited in the structure, so as to form the finest system of natural theology.

Dr. Marshal was no less minute upon the component parts of the human body, than he was original upon various points of physiology. He laboured hard, and we think successfully, to establish the importance of the vascular system, which he considered as the primary mover, and most independent system in the body; by which, or through which, all the great changes of growth, disease, &c. are accomplished. His opinion of the functions of the brain and nerves, will, in some measure, be seen by the present work, as well as his ideas, that the power of contraction in muscles is not borrowed from the brain or nerves.

His new idea respecting the presence of water in the pericardium and ventricles of the

brain is noticed in the present work. It is an important physiological question to know whether these cavities contain water or not in a living and healthy state. It interests both the philosopher and the practitioner in medicine. The result of his experiments and observations is given in the following sheets.

The passive state of the lymphatic system, a doctrine so widely different to that which is generally received at the present day, was an opinion of Dr. Marshal's. But Dr. M. was too good a philosopher, and respected the opinions of others too much, to take up a new subject on weak ground. His doctrine was no less supported by experiment than by reason and observation.

Dr. Marshal also gave a course of lectures on surgery, which were delivered twice a week, in the evening. These were made highly valuable and interesting by an elaborate account of the nature and effects of inflammation, the importance of which, in every subject relating to physic, will be most felt by the man who best observes.

The doctrine of hernia occupied a considerable portion of these lectures. Dr. Marshal had a variety of opportunities of dissecting these tumours, and in the most careful manner he traced

every layer or lamina (which by previous anatomists and surgeons had been confounded under the name of the peritoneal sac) into original parts. This anatomy of hernia was given with much precision, and illustrated with a great variety of preparations and vast number of drawings. An account of these new doctrines will probably appear hereafter.

Dr. Marshal was so intent upon the real business of anatomy, that he did not pay that attention to mere shew, which some men do; however, he had formed no very inconsiderable museum, principally of human and morbid anatomy, at much expence. What he had was good; for things which were defective he set no value upon. They were purchased by Mr. Brooks, a zealous anatomist. Many of the preparations are made in a novel style, to illustrate his own views of the subject. There are some of the finest specimens of disease.

His school of anatomy soon acquired great credit. No man could be more laborious, as a public teacher, than he was; none more anxious for the improvement of his pupils. And all those who attended his lectures will recollect with gratitude his kindness, his assiduity, his intelligent instructions: he did not affect indeed

the graces of public oratory; neither his figure nor his voice were adapted to display them. But no man possessed more of the dignity and gravity of a public lecturer in an important profession than he did.

His soul was obviously in his theme; and his mind was thoroughly acquainted with it. Though slow in his delivery, and sometimes pausing for the words most adapted to convey his meaning, perhaps no lecturer on anatomy has been more truly extemporary than he was.

He had generally notes before him: but so fully stored was his mind with the knowledge of his subject, so clear his perception, and so correct his power of instantaneous observation, that he usually described the parts of the human frame not from book or memory, but from the contemplation at the moment of the actual part he was describing; and no description could be more precise and comprehensive. You saw it with your own eyes, exactly as he described it, and noticed every peculiarity of its shape and appearance, which, if he had not pointed them out, would have eluded your attention.

After ceasing to lecture, Dr. Marshal obtained leisure for practice, which he had before not

possessed; the most appropriate time having been occupied in the dissecting-room. The same conscientious and scrupulous rectitude of mind, which in his lectures caused him to make the improvement of his pupils his leading object, marked also his professional practice. Money and notoriety were not his objects:—his unceasing desire was to do good. He never saw a patient but he was interested with his disease, and indefatigable in his endeavours to remove it. His fee was the least consideration of his mind.

He had that professional enthusiasm which always accompanies the powerful mind. Hence the patience with which he first listened to the details of the symptoms of his patients; the accuracy and acuteness of his own questions upon their accounts; the anxious and profound deliberation with which he afterwards weighed in his own mind, what he had heard and observed; and his subsequent reconsideration of the case when he returned home, and could quietly meditate upon it in his own study, and on the best means of cure. His numerous memorandum books shew the care with which he marked down the symptoms of the cases he visited, and the patience with which he afterwards reflected on them.

His health became gradually, but perceptibly,

weak and precarious, for several years before his death, so that his friends had frequent cause of alarm, before the attack of the disease which proved fatal. For some time he had had a disturbance in the urinary organs; but in July, 1812, the symptoms became more urgent; the micturitions were frequently painful and peremptory, excited upon trivial occasions, especially at night breaking, and disturbing his sleep. These symptoms were accompanied with frequent attacks of fever, which, as the complaint advanced, became more and more frequent and violent, until the day of his death, which was the 4th of April, 1813.

During the period of this most painful illness, which Dr. Marshal supported with the greatest patience and fortitude, he constantly prayed for death, and looked forwards to it as his only remedy. To wish him better only caused him grief.

One evening, when he was very ill, he asked the Editor, seriously, what he thought of the event of his disease. The Editor observed, that those frequent accessions of fever had certainly weakened him very much, yet he had shewn a strength of constitution, by getting rid of them, that induced some hope, that the disease might get into a milder state, so that at least he might live in ease and a considerable degree

of comfort; to which he answered,—"My dear Sir, you distress me."

Yet he considered it his strict duty to support the small remains of life, which was now become so embittered, by every means in his power. Opium had been tried in a variety of forms, but it had never agreed with him; it affected his head, and produced fever. One day he asked the Editor, "whether an opiate enema might be again used?" to which it was answered, that "from previous experience he might expect temporary relief, but at the expence of hurting his general health, and thereby of shortening life." His answer was understood to be, that he wished for ease, even at that price; but the Editor was mistaken, for, on observing to him that, though he was not afraid of death, and even courted it, yet it was his medical attendant's duty to prolong, not to shorten, life, —he fully assented to this, and added, "but we dare, dare not, interfere with that life which God has given us."

Dr. Marshal's religious sentiments were philosophical, but sincere. He meditated on the Deity with reverential awe; and to point out the wisdom that has been exerted in the creation of the human frame, was one of his favourite topics.

He was frequently observed to shed tears while contemplating a picture of the Crucifixion of Christ. And he has himself recorded his opinion of the human soul,—"That there is a soul within us, as well as an Omnipotent Spirit, that fills, sustains, and actuates the universe, I firmly believe; and no less do I believe so from reason, than from the sacred monuments of divine inspiration. But it is to be observed, that in this state of our existence, no act of the mind can be, or ever is, exerted, without a corresponding condition of power in the brain. Brain and soul, though it is unknown how they are united to us, are joint agents in this world; the power and health of the former, in every exercise of sense, judgment, memory, passion, &c. are indispensibly necessary, and equally so with the presence of the mind.

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THE

MORBID ANATOMY

OF THE

BRAIN, &c.

PART I.

THAT WATER IN THE PERICARDIUM AND IN THE VENTRICLES OF THE BRAIN IS AN EFFECT AND EVIDENCE OF DISEASE.

CHAPTER I.

Preceding Opinions on the Subject.

IT was the opinion of the late Mr. Hunter, that the pericardium, even in a healthy state, contained a small quantity of water.—He says, "This bag (the pericardium) has, like most others, a fluid which moistens the two surfaces. In every other cavity of the body, the fluid is no more in quantity than what

is simply sufficient to moisten the parts. In this bag, however, it is more, from whence it has acquired the name of liquor pericardii. There may be about a tea-spoonful in the whole. This fluid appears to be serum, and is commonly tinged with blood, which arises from the transudation of the red blood after death." *

This opinion was also held by some of the older anatomists. Lower in his " Tractatus de Corde" says, " In the empty space between the heart and the pericardium, a certain serum or limpid fluid is always found, by which the external surfaces of the heart are continually moistened." †

The celebrated Haller remarks on this subject,—" The internal coat (of the pericar-

* Treatise on the Blood, p. 141.

† Lower de Corde, c. 1 apud 2. Manget Biblio, An. p. 82.

dium) is every where bedewed with a watery vapour. This vapour, which I have perpetually seen in the live animal, makes the water of the pericardium, sparing but visible, reddish and rather viscid, which some improperly deny; but which disease sometimes immensely increases.—The use of the pericardium is to contain the vapour of the heart. —The watery vapour bedews the warm heart in its rapid motion, and prevents friction and cohesion with the pericardium. If the vapour should dry up, the pericardium will either partially or totally adhere to the heart." *

That water is present in the ventricles of the brain in the healthy state, as well as in the healthy pericardium, has been the opinion of some anatomists and physiologists. At one time this opinion seems to have been

* Haller Physiologia, sect. lxxx.

entertained by Dr. Marshall himself; for in one of his early dissections, related in his manuscripts, he talks of the "usual quantity of water" in these parts.

CHAPTER II.

Dr. Marshall's Opinion and Experiments.

I HAVE not yet been able to discover the precise time at which Dr. Marshall altered his sentiments on this point; nor to trace the facts which occasioned that change:—but I can state from my own recollection, that as far back as the year 1794, he publickly taught, that the presence of water in the pericardium and ventricles of the brain was an indication and effect of disease.

As the opinion, especially upon the first subject, was very different from that which I found in books; and from the excellent physiological lectures which I had heard delivered the preceding year from the Anatomical Chair at Edinburgh, it engaged my attention, and

made me anxious to ascertain its correctness; particularly as Dr. Marshall had declared to me his conviction that the presence of water in these parts, in however small a quantity, was incompatible with their healthy functions.

An opportunity of convincing myself soon occurred; for, in the following year I assisted Dr. Marshall in the following experiments. They were made principally with a view of ascertaining the truth of a new theory which he had formed of the functions of the lymphatic veins: But in examining those cavities we found the following results:

Two healthy well-fed dogs had been selected for the purpose.—After many experiments and observations upon the living turgid lacteals, which it is not necessary in this place to relate, the animals were quickly deprived of life.

The cavities of the brain were laid open, but *not a drop* of water was found in them. The chest was opened, and the cavity of the pericardium exposed to view, but *no water* was seen.—The surfaces were merely lubricated so as to facilitate motion of the parts one upon another. As these parts were laid open immediately upon the death of the animal a little vapour was obvious.

Dr. Marshall, in the year 1809, finding that the opinion of the "usual quantity of water" was still adhered to, instituted the following careful and well digested experiments on the subject.

Exper. I.

February 1809.—A full grown healthy cat was selected. Her throat was cut just above the upper end of the sternum. The cut severed the wind-pipe, carotid arteries, jugular

veins, &c. A few gushes of blood followed, and the animal was dead in about half a minute.

The brain was carefully examined, but there was *no water* found between its membranes. The ventricles were laid open, but *not a drop* of water was found there. The plexus choroides was red and flattish.—There was *no water* in the theca vertebralis.

The chest was next opened.—Her lungs were found of a whitish roan colour. There was no water in the cavities of the pleura. The pericardium was transparent; but contained *not a drop* of water.

The heart was rather flattened. The posterior auricle, and sinistro-posterior ventricle contained but a very little blood. The anterior ventricle and right auricle were completely empty.

Exper. II.

April 7, 1809.—A small turnspit dog that had been well fed, had the jugular veins, carotid arteries, and wind-pipe divided by one stroke of the knife. About four ounces of blood gushed out, attended with a soft sound of expiration :—in a few seconds a kind of sigh was heard, and the ribs descended with a sort of gushing noise. This was repeated three or four times. In about a minute the blood ceased to flow, and all signs of life vanished, excepting some slight involuntary muscular action about the pit of the stomach, making a hollow flapping noise.

On opening the head, the dura mater appeared of a bluish colour, having very few red vessels perceptible. There was *no water* between the membranes. On opening the ventricles *no water* was found in *any* of them, nor in the theca vertebralis.

The chest was opened, and the cavity of the pericardium exposed; but *not a drop of water* was perceptible. The lungs were of a roan colour. The cavities of the pleura contained no water.

The posterior auricle of the heart was nearly empty, containing only a small coagulum. The ventricle on this side was quite empty, and its substance firm; the aorta was of a whitish colour, and empty. The right auricle, anterior ventricle, and pulmonary artery contained a little blood.

Exper. III.

A young mongrel hound, that had been well fed for three weeks, had the wind-pipe, carotid arteries, and jugular veins, severed with one stroke of the knife, soon after taking a full meal of meat. Immediately after this the inferior cava and aorta were also divided.

A gush of blood followed, and all signs of life quickly vanished, excepting some transient quivering in the skin;—the blood was streaked with chyle.

The head was opened;—there was *no fluid* between the membranes of the brain;—*no water* in the ventricles *nor* in the theca vertebralis.

On opening the chest, the extremities of the divided vessels were found retracted within the cavity of the thorax. The lungs were collapsed, and of a roan colour. There was no water in the pleura. The pericardium was opened, but *not a drop* of water was found in it.

These experiments tended to confirm Dr. Marshall in the belief of the truth of his opinion, that there is *no water* in the pericar-

dium *nor* in the ventricles of the brain in the healthy state of the parts.

There is a point in every animal body, at which health terminates, and disease begins. It is important to know what phenomena really accompany health; as their absence is a clear indication of disease.

If *water* in these parts is consistent with health, then the absence of it is an evidence of disease. But the animals that were killed appeared in perfect health; indeed there does not seem the least reason to imagine that the non-existence of water was the effect of disease.

Dr. Marshall's opinion, which he publicly taught, on this subject was, that in a *state of health, no water* exists in these cavities;— that *nothing* more than a *moist vapour*, lubri-

cates the surfaces ; which is removed by the lymphatics, as fast as that vapour forms, or is condensed into water.

Respecting the *use* which water would be of in assisting the functions of these parts, he observed, that instead of water *assisting* the motion of the heart in the pericardium, it would rather *impede* it ;—and that the *first formed drop of water* was the *beginning of the disease* hydrops pericardii. *

* Dr. Marshall's Lectures.

CHAPTER III.

Water found in the Pericardium of healthy drowned Animals.

DR. MARSHALL with his usual discrimination remarked that under peculiar circumstances, water might be thrown out by the action of the exhalents into these as well as into other cavities, in a very short period of time; even while the animal might be said to be dying.

It was from perceiving this fact that Dr. Marshall saw the necessity, in the preceding experiments, of putting a stop to all vascular action as quickly as possible; and those experiments accomplished the purpose almost as rapidly as could be wished for. The fol-

lowing experiments seem to verify the correctness of his discrimination.

It was in the same year that Dr. Marshall made some further experiments in order to ascertain the state of these parts after other modes of death, as by drowning. In these instances he not only generally found water in the pericardium, but also in the pleura, though not in the ventricles of the brain. They are as follows:

Exper. I.

A healthy cat was plunged under water and kept there for the period of two minutes, when she was taken out quite dead. She had struggled violently for about a minute, during which air bubbles arose copiously to the top of the water.

The head was opened next day.—The brain

was firmer and whiter than in the human subject; the protuberances in the ventricles were firm and well configured.—There was *no water* between the membranes;—*none* in the ventricles, *nor* in the theca vertebralis.

The fore half of the ribs was clipped off. The lungs were found collapsed, dense, and of a carmine colour. There was about an ounce of clear viscid water in each pleura, with some bubbles of air floating in it. *

About half an ounce of nearly the same kind of fluid was found in the pericardium, which also contained some air bubbles.

The posterior ventricle, its auricle, and the aorta, were nearly empty. The anterior ventricle, its auricle, and the pulmonary artery were filled with blood.

* This kind of viscid water Dr. Marshall observed he had before seen in quickly-formed dropsy.

Exper. II.

Another cat was immersed under water for about two minutes, and taken out dead. On opening the head *no water* was found in the ventricles, *nor* in the theca vertebralis.

The chest was opened;—the lungs were found of a reddish colour, and there was *some water* in the cavities of the pleura.

There was *some water* in the pericardium also, which was slightly tinged with blood.

The anterior ventricle and right auricle were distended with blood;—the posterior auricle and sinistro-posterior ventricle contained but a small quantity of coagulum.

Thus then in drowned animals we find *water* not only in the pleura, but in the pericardium. It was the opinion of Dr. Mar-

shall, that the water in these latter experiments was occasioned by the peculiar state in which the heart and arteries of the animal were placed by drowning, and was thrown out by the exhalents in the act of dying. Hence these experiments did not in the smallest degree alter, on the contrary, rather strengthened, his conviction, notwithstanding the high authorities which support the contrary opinion, that the *presence of water* in these parts is, in *all cases, an indication of disease.*

In the following pages, therefore, water in those cavities will always be considered as a morbid production.

PART II.

A HISTORY OF TWO CASES OF CANINE MADNESS, WITH OBSERVATIONS ON THE SEAT AND NATURE OF THE DISEASE.*

CHAPTER I.

Introduction.

THERE are some rare diseases which, from their incurable nature, are eventually as fatal as many of those of more common occurence which attack hundreds every day.

* As Dr. Marshal had intended this Part for publication, it is in a more complete state than most of his other manuscripts. It is therefore printed in his own words, with no other alterations than he would probably have made himself before committing it to the press.

In most of these cases of rare disease medicine, so often salutary, is unfortunately unavailing.

In common diseases the comparative experience of many generations has suggested remedies, and established modes of treatment, which we repeat with confidence, and which operate beneficially. But in the dangerous diseases of rare occurrence the practitioner has either never seen the malady before, or if he has, his experience, from its rarity, is too limited to enable him to give the wished-for relief.

Hence it becomes important to study with care, and note down with precision, the symptoms of all unusual diseases, and to record with accuracy the remedies which have been tried, and their efficacy.

By this measure a gradual accumulation

of instructive cases will be made, and the defects of the personal experience of the individual, will be supplied from the information transmitted by his predecessors.

Hydrophobia, or canine madness, is one of those dreadful maladies which happily occurs but seldom, and of the proper treatment of which unfortunately too little is known. I had sometime ago an opportunity of seeing two cases of this complaint, which made a great impression on my mind; perhaps it may be useful to others, if I commit to paper the observations which I then made.

I was struck with the rapid progress of the disorder, the singularity of the symptoms, and the horrid close of the scene. In looking on, some ideas of the disease, different from those I had formerly entertained, occurred; and when the inward parts were laid open by dissection, (for the dead bodies were both ex-

amined,) some before unnoticed appearances presented themselves.

The ideas formed of some changes in the disease, and the appearances on dissection, together with the theory of the disease, grounded on the whole facts, are submitted to the candid judgment of the learned and experienced in medicine.

I had not the immediate care of the patients whose cases are here described; but I am allowed, in order to pave the way for the conclusions hazarded, to prefix the cases at large.

The cases alluded to were not treated in an obscure corner, nor in private practice. They were both notorious; were received into public hospitals; treated by the physicians of these hospitals, and seen by a number of other medical gentlemen besides,

whom curiosity attracted. The one was the case of a young lad, brought into St. Bartholomew's Hospital; the other patient was a young woman, received into the London Hospital.

It seems right further to premise, that the greatest part of the history of the lad is made out from notes, accurately and ably taken, by Dr. Williams of Oxford, then the physician's pupil. The earlier state of the young woman, after she was taken ill, was observed by Mr. Parkinson, Surgeon, in Hoxton, who, besides, made some accurate observations on the nature of her malady, as will be mentioned in the proper place. The remainder of the cases was filled up from information communicated by the physicians who had the care of the patients, and from my own observations and enquiries.

CHAPTER II.

Case I.

THOMAS PEARSON, apprentice to a butcher, about 14 years of age, of a healthy appearance, quiet in his disposition, and attentive to his business, was standing in a gate-way in Grub-street, opposite to his master's stall, on the evening of the 27th of May, 1787, when a strange mastiff, passing along the pathway, bit him unawares in the hand; and moving straight forward at a common trot, was soon out of sight. The lad was surprised. No cry of mad dog was raised, nor was it ever known what became of the animal.

His mother and master brought him next

day to St. Bartholomew's Hospital, into which he was admitted. On inspection, it was found that there were two or three small superficial bitten wounds on the end of the ring finger; which were touched in every part of their surface with lunar caustic, at the same time a dram of mercurial ointment was rubbed into the inside of the fore-arm, and this was repeated on each of the four succeeding days. No other prophylactic was judged to be necessary, there being no certainty that the bite was by a rabid animal. He remained five days unaltered in his health, suffering no farther grievance than what arose from the slight bitten wounds, to which the caustic had been applied; he was in good spirits, boyish, playful, pleased with the novelty of the scene of the hospital, and not in the least alarmed as to the event.

On the 1st of June, *i. e.* on the 6th day

from the accident, (reckoning the 27th of May the first,) he appeared somewhat dejected in his looks, though he continued to stir about in the ward as usual. The wounds now appeared sloughing, running into one sore ; and the discharge bad. An abscess was observed to be forming in the palm of the hand, a redness was remarked on the forearm, but no distinct lines of inflammation ; there was pain in the hand, particularly in the bitten finger, extending from thence up the arm to the shoulder. In the evening he was uneasy, went earlier to bed, and appeared to be affected with slight fever.

The physicians of the hospital, at the visit next day ; ordered Peruvian bark in powder, a dram thrice a day, the mercurial ointment being discontinued. He began taking the medicine last ordered ; in a few days the sloughs separated, the granulations put on a healing appearance, and the discharge be-

came better. At the same time the pain remitted in the arm, and the general indisposition, into which he had fallen, went off.

In this state of apparent recovery he continued about three weeks, during which time he continued taking the bark; the wounds not healed, but contracting and healing.

Wednesday, June 27.—But on the 27th of June, a month from the accident, and more than three weeks from the first transient alteration in his general health, he relapsed into a similar indisposition, but with new and more aggravated symptoms. The pain arose afresh in the shoulder, extending into the arm-pit, and thence into the side of the breast; pain was felt in the head too, with some giddiness; the appetite for food failed, and he appeared to those about him to be very uneasy and unwell.

He had an unquiet night, scarcely ever falling asleep, and when he did, he was disturbed with startings, and awoke scared. The respiration was somewhat confined and uneasy; the pulse was not adverted to this night.

Thursday, June 28.—On the 28th, he was so much worse as to keep in bed. Now a fresh symptom made its appearance; he said he was dry, and on getting some drink he was surprised to feel a difficulty in swallowing. He drank as much as he wanted, but it was with difficulty.

One of the by-standers, out of medical curiosity, some time after proposed he should drink again. He complied, though he said he was not thirsty. Water was brought him. He looked on it with perfect indifference, and lifting the bason containing it to his head, began drinking; but in making the very first swallow, he experienced an ob-

stacle to the descent of the liquid. Holding the vessel, he said composedly, "it stops my breath; I shall be choaked;" then laying the other hand on his stomach, he added, "something rises straight upwards from here, which stops the drink." He tried it again, and with a great effort got down a little, and at finishing looked somewhat wild.

The throat was looked into, but nothing unusual was discerned there, excepting that the tonsils were thought to be more than usually protuberant, and the tongue rather dryer than common.

In the afternoon it was remarked that the eyes were become more prominent than usual, with a slight dilatation of pupil. The pain in the side was increasing, the loss of appetite at times bordering on nausea, the respiration uneasy as before. An anxious expression of countenance became fixed. The pulse was

now remarked to be tense, and somewhat quickened.

He was revisited in the afternoon, and an alteration made in the medicines. A large blister was applied to the outside of the throat; a grain of emetic tartar, in pills, was given him; and he was ordered to have a grain of opium with about six of assa-fœtida, in pills, every three hours. The Peruvian bark was discontinued.

The emetic tartar, which was exhibited immediately, caused some vomiting, though not much, as he did not drink. There was nothing remarkable in the contents of the stomach thrown up.

After the operation of the emetic tartar was over, the pills ordered were taken for the first time, and were continued for every three hours afterwards, as directed.

In the evening some of the symptoms were aggravated, others disappeared. The pulse was accelerated to 98 in the minute, but regular, and continued to be so; the inspirations were a little deeper; but the pain in the head remitted; and no more complaint was made of the pain in the side; nor of the nausea.

About eleven o'clock at night, having taken twice of the pills, he dropped asleep; but his rest, as before, was disturbed by startings, and but of short continuance. On awaking, he was found in a perspiration, and thought himself refreshed. He was evidently relieved; the pulse came down to 80; the countenance looked more composed; the respiration was easier. He thought he would now endeavour to swallow; for the difficulty of that seemed to him unaccountable. He tried with some water; the first mouthful went down without stoppage, but when he was preparing to take a second swallow, he

began to stare wildly, and on making the attempt, he became violently agitated, as if strangling; sputtering back the liquid from his lips.

He was revisited about midnight, when some alteration was made in the pills; emetic tartar was substituted for the fœtid gum; viz. about a grain of opium conjoined with about $\frac{1}{8}$th of a grain of emetic tartar, made into a pill, to be taken every hour.

In course of the night, about eight of the last ordered pills were taken; the blister, towards morning, was found to discharge copiously. During the night, he had some short perturbed sleeps; attended with a little perspiration. Another new symptom was now obvious; a brown viscid mucus on his mouth and throat, which obliged him to spit out fretfully.

Friday, June 29.—Similar symptoms as

as yesterday,—but worse upon the whole. The skin was moist nearly as in health; respiration apparently easier; the tongue moister, and slightly white; but the pupils, which were formerly dilated, were now much contracted; the pulse had quickened to 120. Some milk was brought him for breakfast, the sight of which made him fancy he had some appetite. Accordingly he began to sup of it. The first spoonful he took up threw alarm into his looks; but on introducing it into his mouth, he was agreeably encouraged, by finding he could swallow it. He supped another, and another, till small flatulent eructations arising quickly in succession up the œsophagus, obstructed the passage, and obliged him to desist. He paused a little, and then took two or three spoonfuls more; and he said, "It is the wind and phlegm that plague me, and prevent my swallowing."

After breakfast-time he became heavy,

and inclined to sleep, but did not fall asleep. He mentioned incidentally, some slight uneasiness about the stomach. The pulse at 150. Respiration still a little uneasy.

In the forenoon it was observed, that ever since the severe relapse, neither the alvine nor urinary evacuations had taken place; on this account, a clyster was thrown up; which it was reported, produced two evacuations; whether any, or what quantity of urine was discharged at the same time, was not remarked.

The difficulty of swallowing was now become great. Being urged by some of the bystanders to drink barley-water, he gave little or no attention to the importunity, desirous, it seemed, that what was proposed should be dropped It was then said peremptorily to him, "Why don't you drink?" upon which in a whimpering tone, and with

sobs, he replied, " It catches me here," pointing at the same time to his throat. A stoppage too, lower down, was indistinctly complained of; laying the other hand on his stomach, he said, "it works up from here," and at last he mentioned a ball in his throat. He made every effort in his power to drink; but on lifting the cup to his head, his hand shook, he looked wild, and no sooner had the liquor touched the outer edge of the lips, than his breath seemed to be stopped, and his whole frame was violently agitated. He threw himself back with a scream, his countenance expressing wildness and terror.

A farther change in his condition, and still for the worse, came on in course of this day. He appeared sad and pale in his looks, taciturn, speaking neither of his sufferings, nor of any thing else. If a question was put to him, he answered it with brevity, but without any hurry or indistinctness in his voice. The

urine was discharged at different times in small quantities, thickish, and of a whitish brown colour.

In the afternoon he wished for a little wine, fancying that the sharpness of the wine would cut the viscid phlegm, which he thought was a principal obstacle to his swallowing. At his desire a crust of bread was brought, and one end of it sopped in some red wine, which he desired to have in his own hand, for this he made an indispensable condition of every attempt to swallow since he had experienced the difficulty. Looking the nurse in the face, he unawares turned the dry end towards him, bit off a morsel, which he chewed with perfect ease; but the attempt to swallow it almost choaked him, and threw him into violent agitations, on which he spit it out.

It was agreed on by the bystanders, that

the sight of water gave him no uneasiness; he looked on it with perfect indifference; it was only when urged to drink that he was roused and alarmed. So far from any horror of water, the sight of it seemed to please him, for he said he had great thirst, and the simple contact of drink, provided no effort to swallow was exerted, was a solace to him. When, in the struggle to swallow, a little water happened to get into the throat, he said it went down comforting him; and for half an hour at a time he would keep his mouth open, accommodating his tongue, so as to be constantly refreshed by the back of a pewter spoon, repeatedly dipped in cold water.

In the course of the evening the nature of his complaint, and the circumstances respecting the dog, were talked upon in his hearing. This raised no fresh uneasiness, nor did he seem to have ever attended to the bad consequences of such hurts.

The nurse put her fingers into his mouth, separating and drawing out the viscid brown phlegm, which gave him so much trouble. He shewed not the least disposition to bite.

About bed time he seemed inclining for, but did not sleep; his pulse was swift; respiration a little uneasy. The pills were discontinued.

He remained quiet and awake till past midnight, when he grew miserably uneasy; violent for getting out of bed, and enraged at the viscid mucus in his mouth. The nurse advised him to rest quiet, and began to draw the curtains closer, when instantly, in a firm decided tone of voice, he cried, "don't draw them, don't draw them," as if wanting air.

By four o'clock in the morning, in spite of the entreaties and prudent management of the nurse, he rose forcibly out of bed,

and making his way to the door, he walked about for a short time; in doing which in a freer air, he became quiet again.

Saturday, June 30.—The disorder seemed greatly aggravated. The countenance was steady, but turning keen; pupils a little dilated again; the phlegm now whiter and frothy; the pulse incredibly swift.

As to deglutition it was now not merely difficult, it was become impracticable. The very mention of drinking threw him into disorder. Before the cup reached his lips he was choaked and convulsed; if he took any solid substance into his lips, though formerly with some management he could swallow solids, it immediately excited the agitations.

It was remarked in the course of the forenoon that he was inattentive to what was

said to him, betraying some confusion of thought, and forgetting himself a little. He began to be disquieted by the most trivial circumstances, as the presence of any body but the last person he had seen, &c. He was removed about this time from the ward to the nurse's room.

An unusual sensibility in his skin to certain impressions, was remarked. A single drop of warm urine (about this time he had a desire to make water,) falling from him on the inside of his thigh, made him start. The lip of the wash-hand bason, into which he made a little limpid water, touching his skin, agitated his whole frame.

But while the sense of touch to certain impressions was become exquisitely fine, the organs of the other senses seemed to retain the usual sensibility, or rather there is ground for believing that some of them were

blunted. He did not listen to small sounds; he made no distinction of tastes; it seemed to make no difference whether milk, wine, or a bit of an orange was applied to his tongue; he appeared to perceive a difference in the heat, cold, or liquidity of substances, more than in their sapid qualities. Though there were different flowers in the room, he paid no attention to smell. As to the eye, it was brightening, but the power of sight was turning fainter.

Certain other feelings became finer. Upon seeing a relation by the bed-side in tears, he instantly plunged his face under the blanket, crying abruptly, "Don't cry, don't cry, or I shall cry!" When he uncovered his countenance again, it was alarmed and discomposed. Calming a little, he said to a comrade, who was come to see him with his kinswoman, "Be a good boy, Billy; Master Billy, be good; you know not how soon

God may take you." Thus it should appear that at this time he was perfectly sensible.

In an hour after, he was seized with a fit, which frightened the nurse. He was lying quiet, with a countenance pallid and dejected, when he suddenly cried, "Nurse, nurse, clear my mouth," (meaning of the viscid phlegm.) She ran to the bed. He seized her eagerly by the waist. Extricating herself, she held him down in the bed; the white froth working out at the corners of his mouth, and the skin about his eyes and lips turned of a darker colour.

Recovering from this fit, he lay for some time quiet again, with his pupils more dilated; pulse too swift for numeration; look, steady and dejected; inferior extremities turning colder. The sight of water, presented by the nurse, did not always disorder him; but when water was presented by

any body's hand he was not accustomed to, it threw him into the greatest disorder.

In two hours more his appearance was totally changed. His face, which had been pallid, sometimes composed, sometimes dejected, became uniformly red, warm, full, and perspiring; the neck and breast likewise were warm and red; the eyes far more vivid, pupils dilated; his tongue working within his closed mouth; the body slightly agitated; his breathing apparently easy, and his pulse very quick.

June 30, *evening*.—About seven o'clock in the evening he began to rave violently with an altered voice. "I see," he said, looking scared to a corner of the room, "I see—" The nurse asked what he saw? "I see two girls, and a black boy; and the boy's belly is ripped up;" immediately screaming aloud, and struggling with his whole force,

terror in his look, to escape, as if from so horrid a scene; working with his tongue, and sputtering out the white frothy saliva. While the nurse held him down, sitting behind him in the bed, and holding his wrists, he screamed again, and struggled to escape. He then became calm for a minute or two, but with terror still in his looks.

He soon roared aloud again, exclaiming, "Biting me! my cheek, my cheek!" and drew his head with frightful grimace to the opposite side. From his exclamation it would seem that he thought some animal was attacking him, and if the nurse had not held him down, no doubt he would have run from the fancied danger.

He became again a little calmer, though he still seemed attentive to something that frightened him, which he did not explain;— a handkerchief, with which the frothy saliva

had been wiped from his mouth, caught his eyes as it lay wisped up on the top of the bed; this he seemed to take for an object of danger; for, fixing his eyes on it, he roared out again, "My cheek, my cheek;" struggling and terrified as before.

As if escaping from this danger, his terror subsided, and he seemed greatly fatigued with the violent exertions he had made; the white froth flowing down from the corners of his mouth in two streams. Suddenly he said, "Naughty Billy, to stay so long on the message!" as if he were at home, blaming somebody of his acquaintance.

In about ten minutes his ideas changed again. He seemed to fancy himself at a river side, for he cried out, "The boat, a-hoy!" Presently, as if in it, he said, "The boat fills!" Almost immediately, as if some one had fallen from it into the water, he

shrieked out that such a one was drowned, and looked and exerted himself, in spite of the nurse, to give assistance.

A new transition of thought rapidly came upon him, and he cried out, "It cuts me; cuts Tommy's hand off!" In a moment again some other alarming scene appeared before him connected with his sister, for he exclaimed, "O! what a creature, to bring my poor sister into such a place! Good God, and to leave her here!"

The fancied danger quickly extended to himself, and he screamed out, "Ripping open my belly!" with looks of agony and terror, and the most violent struggles.

After these emotions, some ludicrous domestic scenes occurred to him, which he followed by uttering in a lowered tone, "O what a naughty boy! Tommy; O Tommy,

none of your good Gods! God will have nothing to do with you."

He now lay silent awhile; his face and neck steaming with perspiration, the white frothy saliva running from his mouth; writhing a little with his body; bending and extending his limbs. Soon, however, he seemed to be in a still greater difficulty, which afterwards appeared to be a robbery; he struggled hard to escape, and as the nurse kept him down by holding his wrists, which prevented him from getting off, he used all his force, kicking against her, heaving her weight off, and attempting to bite her hands, when brought near his mouth; and expressing in his look the greatest terror and dismay. In the midst of his alarm, he said, as if taking courage, and recollecting himself, "They could not swear to the robbery."

He became again more tranquil, and asked,

" Did not I stay at home last night ?"—But then he added, " Did not I squall and halloo out ?" one of the persons present replied, " You did, Tom ;"—" I did not," he rejoined ; which incidental question and answer seemed to restore his proper recollection ; for looking round, he said, " Let me go home, the physicians don't know my disorder." But instantly, as if fancying himself out of the hospital, going elsewhere ; he cried out, " You nasty hound, you rascal !" Again some cruel case appeared to distress him, for he added, " You rascal, to cut the poor boy in such a manner." His subsequent exclamations implied, that he supposed himself to see some unnatural crimes committed.

Six hours of such a succession of horrid ideas and great exertion, at last exhausted him, and towards one o'clock in the morning, he began to be more calm, and occasionally on the border of knowing his real situation, and

of reason. "Nurse," said he, "you are a deceitful woman; you said Tommy would be better, you see how it is;" he added, "Did not you say, Tommy is a good boy, for not talking of the devil?" The mentioning the devil roused him to a sort of rage, and he burst out, "He'll have her ere long," and, looking sternly at the nurse, "You too, Ma'am." Soon however he began to lay more quiet; the face seeming somewhat dryer of perspiration, and the general rosy redness going off about the temples and forehead. The pulse was now becoming incredibly minute as well as swift; the whole body stirring with convulsive twitches. The looks he put on were no more wild and frightened, but eager and serious, expressing a deep interest in his mind in ideas which he did not express.

In about half an hour more, the capability of suffering and power of acting were nearly

exhausted. His looks, turning uniformly pale, became more placid. His strength failed, the nurse let go his wrists, he lay quiet, with only now and then some feeble agitations of his limbs. The eyes fixed in the sockets, turned dim, and insensible to light; instead of shrieking, he only incidentally muttered some occasional remarks.

After the power of seeing was lost it was remarked that he still heard; for it was asked with a loud voice applied to his ear, "if he would drink?" to which he with apparent indifference made a saucy reply: then he said incidentally, "he was going home."

The pulse was now no longer perceptible at the wrist; coldness, which had begun in the extremities, pervading the trunk of the body; the respiration appeared to me to be the opposite of laborious, being small, and a little confined. He lay perfectly still;

and looked placid, except when disturbed by feeble convulsive twitches about the eyebrows, forehead, and sometimes the cheeks.

In half an hour more, all sense was abolished, the coldness went deeper into his body, the heart ceased to quiver, and he expired.

CHAPTER III.

Case II.

The Case of the Young Woman.

ABOUT the end of February, 1788, a terrier dog, belonging to the Rev. Mr. Clare, of Hoxton, was observed to alter in his look; his eyes grew dull and heavy; he seemed in much pain, biting his tail, and tearing the hair off his body; and sometimes he angrily tore a small piece of carpet on which he used to lie in the dining-room; yet he continued to take victuals, and lapped water greedily. The maid servant in Mr. C.'s family was the person who had the charge of the dog in this illness; for he was a favourite of Mr. C.'s, and therefore taken great care of. She gave him his victuals and drink;

led him out, and locked him up in an out-house in the night. In the morning she made up the bed for him in the dining-room, and sometimes walked him in the garden.

Whatever opinion was conceived of the dog's illness, none of them supposed him to be mad, as he had not been known to be in the way of being bitten by any rabid animal; for as Mr. Clare, through bad health, had been confined to his room months before, the dog during all that time had remained at home, almost constantly in the same room.

He continued four days in this state; at the end of which time he was committed to the care of a neighbour, his hair-dresser, and tied up for two days, during which time he almost gnawed the post to which he was tied, in two.

He left off taking victuals, but continued

to drink occasionally. After keeping him two days, the hair-dresser set him entirely free. The dog followed the man into the street, where he fought and bit the first dog he met with; parting then from the hair-dresser, he was next seen at Haggerstone, where he attacked, fought, and bit another dog. The cry, mad dog! was raised, and he was in a minute destroyed. As for the two dogs bitten, Mr. Clare took the trouble to trace both to their respective homes. One was killed; the other his owner would not have destroyed; and in Aug. 1788, when I made the enquiry, he had remained in usual good health.

As Mr. Clare's dog had not been snappish to any body, none of his family harboured the least apprehension of any possible bad consequences from its illness.

But on the evening of the 13th of April,

about six weeks after the dog's illness, the maid, Mary ———, who had been nurse to the dog, when sick, a steady hard-working young woman, about 21 years of age, lately from the country, healthy in her appearance, with her hands thick and chopped from much scrubbing, "felt a slight chilliness, succeeded by pain in the head. She had pain too in the right arm, with a degree of numbness in the right side of the chest."

If the young woman had been indisposed before the 13th of April, she made no complaint of it. Mr. C. recollects a trivial circumstance, perhaps connected with the rise of that indisposition, with which she was evidently affected on the 13th of April. She had a sort of provincial thickness and indistinctness in her speech, and on one of the days preceding the 13th of April, when waiting at table, Mr. C. observed her speech more indistinct than before; "Mary, I think you

speak worse than ever." She replied, "she thought she did;" and no more was said.

She had a restless, uneasy night, but rose next morning to her work; the pains and uneasiness abating.

Tuesday, April 14.—At breakfast, she mentioned with some surprise, that she could not drink her tea; and "in the space of an hour, employed in repeated attempts, she was able to drink only a single tea-cupful." What other symptoms appeared about this time is not related. Mr. Parkinson attended her; and the first part of the following facts is taken from his information.

She was in bed when seen in the evening. Her countenance was strongly impressed with dejection and anxiety; a considerable degree of moisture appeared on her face, the hands and neck were drier, the tongue clean,

a slight tinge of redness on the white part of the eyes, the pulse small, and about 100 strokes in the minute."

Mr. P. asked her, "what she most complained of?" She replied, "that she was without ailment or pain, unless she attempted to drink, but when she began to drink, that she felt a violent catching of her breath, with pain darting up into her head." Mr. P. finding a bason of water-gruel near the bed-side, inquired whether she would take some, to which she consented; accordingly he presented a tea-spoonful to her, but before it reached her lips, she fetched a deep inspiration, and the whole body shuddered, as when cold water is poured unexpectedly on the naked frame. By some perseverance, and at a calmer moment, the spoon was got within her lips, and she swallowed about half a spoonful. She took the spoon in her own hand, but before it reached her lips, the same sort of disorder in her frame was re-

newed, with this difference, that the hand holding the spoon was, at the same time, involuntarily snatched away from the mouth.

She then bethought herself, that she might succeed better with plain water; water was brought to her in a bottle, and Mr. P. sitting on the bed-side, poured the water from some height into an empty glass, the hearing of which, he asserts, caused her to fetch a deep sigh, and made her complain of a catching in her breath. A small quantity was held to her lips that she might drink, which made her uneasy. She said fretfully, "you will pour it all over me, you hold it so close to me." She insisted on holding the glass in her own hand, but no sooner had she lifted it to her lips than violent agitations of her body were produced, by which the glass was thrown out of her hand.

Mr. P. then, in order to learn how she would be affected by immersion of part of

the skin in cold water, hinted to her that her hands were not clean; upon which a wash-hand bason with water and a piece of soap was brought to her. Without betraying any dread of the water, she immediately dipped her hands in it; the immersion excited a deep inspiration, and sudden agitation of the whole body. She kept hold of the soap, protracting time in rubbing it well on her hands and arms, but could not be prevailed on to dip her hands again in the water. It appeared, that in her trials to swallow drink, the obstacle arose, and the sudden commotion in her whole frame, before the liquid touched the lips.

Once, when the drink was received within the lips, she as yet could swallow. To ascertain this fact Mr. P. dropped water out of a tea-spoon on her tongue, the mouth held open. She could swallow water thus received easily, and with pleasure; but if at

the same time a drop was spilt on the external skin, it caused violent agitations and great disorder.

In the evening, whether from appetite or as a trial to swallow, she got a tea-cupful of bread and milk; and found she could swallow soft food more easily than drink. The taking in of the first spoonful raised disturbance in her frame, but by retaining it in her mouth, till the agitations ceased, she was able to swallow it, and took the rest with more ease.

She had an unquiet night again; in the earlier part of it she swallowed some calf's-foot jelly, with ease; but in course of the night, sudden deep sobs, and violent agitations were produced, upon her attempting to swallow saliva, which began to collect in her mouth.

Other symptoms, besides the difficulty of

swallowing, and effect of water on the body, were not attended to on the Tuesday.

Wednesday, April 15.—At breakfast-time, she experienced great difficulty in swallowing solid food. She chewed some bread and butter, with great ease, but could not swallow it without great difficulty and disorder. A large blister was applied to her throat, and another between the shoulders.

After breakfast-time she was removed from Mr. Clare's to the London Hospital, where the disorder appeared to be fast increasing. The eyes were unusually prominent; pupils dilated; countenance dejected; though the complexion of it remained with little alteration. The pulse was found to be small and swift; a slight oppression about the pit of the stomach. The attempt to swallow liquids was tremendous; the agitations sudden and vehement, upon their approaching the lips. The dif-

ficulty to swallow solids was very great; a small piece of ice was directed to be given her, in the expectation she could swallow it more easily than water, and that it might serve instead of drink. When it was brought near the mouth, a waving spasm run round her lips, and shut the mouth against it. By some perseverance it was introduced; and in swallowing it some agitations were produced.

As she had had no evacuation per anum, nor of urine, since this illness, a sharp purgative of colocynth and aloes, in the form of pills, was administered to her, for she retained the power of swallowing pills. Two were given her every two hours till they took effect.

To relieve her in the danger she was immediately in, without wasting time in trials of boasted, though unavailing, remedies, she was ordered immediately into the warm-bath.

Dr. Hamilton attended himself, to observe the effects; and he was of opinion, no benefit was derived from it. None of the symptoms were relieved, and one, the confinement about the lower part of the breast, was rather aggravated.

In the evening the pills produced the effect, but it was scanty. Whether along with the effect of pills, urine was discharged, was not recollected. The physicians, returning to visit her, directed a clyster to be exhibited; and it was remarked that the exhibition was resisted by violent contractions about the anus. The nurse contrived to exhibit it, but it immediately returned, without any fœculent admixture. Another was forced up, with as little success. On trying a third time, the contractions and workings about the anus were so strong, as to exclude the pipe entirely.

There being ground for concluding that

the bowels had become affected with considerable disorder and costiveness, the purgative pills were ordered to be continued, one every hour; and also pills containing musk and opium to be given alternately with them, every hour. The blisters had risen well.

Wednesday night she was very unquiet; she at times forgot that she was inthe hospital.

Thursday, April 16.—In the morning as she seemed somewhat oppressed in her breathing, the windows of the ward were thrown open, which seemed to relieve her. The pulse was swift and small; swallowing impracticable, and the attempts dreadful. She began to rave: thinking she had been accused of some crime, for which she was in prison, she sprung up to make her escape out at the window, saying with agitation, "she had done no harm."

A straight-waistcoat was slipped on her,

to confine her in bed. The medicines were discontinued.

About eight o'clock at night, Dr. Lister and myself accompanied Dr. Hamilton to the hospital, to see his patient. On entering the ward we heard a single female voice speaking thick and eagerly in the dark, (for the other patients had been removed, to leave her quiet.) A candle was brought, the curtains were undrawn; the young woman was lying on her back, exerting all her force to get up; terror in her countenance, eyes glistening, pupils much dilated, whole face and neck uniformly red, steaming with perspiration; pulse incredibly swift and small. She became very restless. Her tongue was clear; and saliva was running from the corners of her mouth.

We found her under great terror. She was calling out, "let me go, let me go," with

fear in her looks, and struggling to get away. By transitions, too quick to be marked, she seemed to fancy herself at the entrance of some horrid place; "now do go in first; well, I will enter." Quick as her own thoughts, and as if exposed to ruffians, with alarm still in her look, and in an earnest imploring manner, she said, "as you are a gentleman, you will not leave a helpless girl to these...." Her agony of terror increased, and she cried peremptorily and wildly, "don't leave me, Sir." Her mind was in a moment hurried from this idea to a place where she was going to be used cruelly by a woman, "she will tie me up! break my bones!" she cried, exerting all her force to escape, with terrified looks. She then sunk into a calm state for a minute, but soon her frightened looks, and averted head and neck, expressed a fresh conflict with danger. Her mind became a little more tranquillized, but still unhappy from fancying herself detained by force from

obeying some order of her mistress, "let me go; my mistress wants me." The apprehension of her mistress's anger encreased; "I beseech you let me go;" then with imploring looks, "I pray, as if at Heaven's gates, let me go, but for five minutes; I will return to you, indeed I will; my mistress calls."

While she was thus taken up with the thoughts of her mistress's anger, a piece of orange was offered to her to eat. She said, "I will; do let me go to my mistress." Being drawn by the presence and importunities of the bystanders to attend to the present objects, she received the orange into her own hand, muttering, "it will choak me;" then struggling hard, as with an idea to get home, she, as if designedly, dropt it under a fold of the blanket, running on with her previous ideas, "as you are a gentleman, do not hinder me, I must go."

In a moment, the transition not perceived, she fancied herself again exposed to cruelty, for with sudden terror and pain in her looks, she cried out, "they are breaking my legs." After this emotion she seemed in a place of safety, where she lay quiet a minute or two, as if breathing from the toils and dangers she had undergone.

The opportunity of her becoming calmer was seized to engage her attention to a present object; a tea-spoonful of gruel was offered her to drink, and she was urged to take it; she said, as if returned to the knowledge of her real situation, she was not dry; then began to rave again about her mistress. It was said it would do her good; upon which she seemed by her manner as if she wanted to have the spoon in her own hand; it was given her; but she only put off time, holding the spoon in her hand, and requesting to be allowed to go to her mistress, till she spilt

the contents by little and little on the bed-clothes. Her attention having been thus called to present objects, she seemed to return to the knowledge of herself.

Another tea-spoonful was put into her hand, upon which she signified that she was hindered from properly taking it by her hands being confined. The cords of the sleeves of the waistcoat were slackened, and she was requested to swallow the gruel. She held it in her hand, beginning to be intent again to get to her mistress; and it was remarkable, that without knowing what she was doing, or at least without giving attention to the act, she put the tea-spoon into her mouth, and swallowed the contents.

As she was miserably restless, and sometimes violently struggling, it was said, if she would be still, her hands and arms should be set at liberty. She seemed to assent to

this proposal, and the cords were untied; but the moment she felt her arms and body at liberty, she began to turn down the bed-clothes. Her looks kindling afresh, and expressing that she was bent on escaping, or doing something dreadful, the cords were drawn tight again, and her body confined.

It is needless to say, that had she been released she would not have been freed from the distress and tortures she underwent. She would still have been led into painful situations; still cruelly treated; and still subjected, in agonies of grief or fear, to the danger and distress of mind. In actually roving from place to place, she would have given no attention to present scenes; but might soon have been destroyed by falling from a window, or by pushing headlong into fire or water.

We staid about twenty minutes at her

bed-side, and in that short time she underwent the sufferings last enumerated, and many more not enumerated. It was interesting to see her appearance and agitations. It was distressing to leave her in such poignant misery, without being able to give the smallest relief.

As we went out of the long-ward we heard her exclaiming, as if in a fresh conflict, with some fresh overpowering danger; and when the door was shut after us, her eager interesting voice was still heard at a distance, complaining, beseeching, shrieking, in darkness and solitude.

It was reported to the physicians of the hospital that she died about one o'clock in the morning; but what changes in her appearance and sufferings took place in the interval, were not ascertained.

CHAPTER IV.

Comparative View of the two Cases of Hydrophobia.

IN comparing these two cases together, it may be observed, that in each there were three successive states corresponding in some degree to each other—corresponding exactly in respect to succession, though not exactly so with regard to the length of the periods.

It is probable that these three states are common to all cases of hydrophobia, and, it seems of importance to mark and compare them, as it will not only help to point out the periods during which prophylactics ought to be tried, but also two distinct stages of the malady in which different remedies ought to

be had recourse to, with a view of accomplishing a cure.

The first state to be noticed was a period of health, an interval of suspence, which was passed between the application of the poison and its effects upon the system.

The second state to be marked was the *first stage* of the disease, beginning with a local affection* accompanied with a general irritation of the heart and arteries.

The third state, which was the *second and last stage* of the malady, is a state of madness, beginning when the functions of the brain become particularly affected, and soon ending in death.

* The term local is used because, though the woman was not bit by the dog, yet she had pain up the arm and along the side of her body, something similar to that of the boy.

The first, or previous state, in the case of the lad, lasted no longer than five days,* in which time he seemed to continue in his usual health. It was longer in the young woman. About five weeks intervened between her nursing the sick terrier with her hands chopped, (for the present it is assumed that she caught harm from the dog,) and the evening on which she was evidently taken ill herself. But perhaps it is impossible to fix the duration of the previous interval to an hour, or even to a day ; for the mischief, as in morbid alterations is often the case, might gradually creep into the constitution, producing in the first instance a degree of disease,

* Perhaps it may be doubted by some, whether this first illness, which went off, and left him well for about three weeks, was the beginning of the disease hydrophobia, or an accidental circumstance unconnected with it. Probably it is not material to determine the question, nor is it an easy matter to do so, as it is a point upon which different opinions may be entertained. If it should be considered as distinct, then the correspondence of the two cases is greater.

too slight to be calculated, because not amounting to a perceptible impediment of the customary actions.

Hence both might have been ill, and of the disease in question, before indisposition was suspected; young persons, in the humble condition of life, being little accustomed to tender attentions, and usually more than able for their work, do not complain of indisposition, unless they feel some considerable pain, or are surprised to experience some unusual inability.

The state of disease, without the loss of reason, was also of unequal duration in the two. It was lengthened out in the lad to the space of thirty days; pain was felt in his arm, with what was called feverishness, on the 1st of June, and the madness commenced on the 30th of the same month. As for the amendment which took place after

the supposed febrile attack, and which lasted about three weeks, it appeared to be a suspension of mischief begun, not a removal of disease. But the young woman was only three days ill, on this side of madness; being taken ill on the evening of a Monday, and beginning to be mad on the morning of the Thursday of the same week.

Though the duration of this stage of the disease, differs in the two subjects, the symptoms which characterize it in the one case bear a striking resemblance to those which characterize it in the other. The lad's indisposition began with pain up the arm, head-ache, and some increased frequency of pulse; and after the intermission noticed above, the pain arose afresh about the shoulder, extending into the arm-pit and into the side The attack on the young woman was, in like manner, marked with head-ache, pain up the arm, and what was called feverishness.

The lad said he could feel a slight confinement of respiration, referred to the lower part of the breast; the young woman complained of the same thing, though later in the disease.

In both, the pulse soon became frequent, and was gradually accelerated, till at the latter end of this stage, it was impossible to count the minute motions of the artery.

In both, the tongue remained free from foulness, though at times, more or less whitish, and slightly dryer than is usual; the mouth in both, towards the end of this stage, filling with a ropy mucus, and an unusual quantity of saliva.

Neither expressed any loathing of food; both seemed capable of taking food, so far as appetite was concerned; but the degree of the appetite for food, was not expressed. Nor

was there any febrile prostration of strength; for both could sit, stand, walk, lie down and rise up, without complaining of inability.

Constipation of the belly seemed to take place in both, and both made but little urine.

The countenance of both was serious and dejected, the pupils a little dilated; both were awake night and day, or had only short and unquiet sleep. Both were inattentive to present objects, appearing to be absorbed in their own mental suffering; yet when called to attend, both were capable of attention.

The difficulty of swallowing, which it would seem, has always engrossed the attention of observers, though it is not the most formidable of the symptoms, was of the same nature in both; yet differing in degree, and in some accidental cirsumstances. Both were some time ill, before they experienced this difficulty.

When it arose, both could swallow soft or solid food, more easily than liquids. In both it gradually increased, to such a degree, that the attempt became almost fatal, and threw the whole frame into the most violent agitations.

As is hinted, favourable moments occurred, when both could swallow; and throughout the whole disease, both could swallow solid substances, in the form of pills. Some differences of this symptom were observable in the two patients, and they seemed to result from a difference of age and sex. The lad experienced the difficulty, and sometimes, the impossibility of swallowing, only when he tried to force the morsel down into the pharynx. The young woman experienced the difficulty the moment she intended to swallow. Before the cup touched the lip, provided it was carried towards the mouth, while she intended swallowing, she was almost choaked, and went off in violent agitations.

While both dreaded, and sometimes absolutely refused to swallow, it seemed a clear fact, that neither of them had any dread of water. Both could look on water, and other liquids, with indifference. The lad was highly gratified by the application of cold water to moisten his tongue. The dread was of the act of deglutition, not of the liquor, considered either in its appearance, nature, or effects.

Towards the end of this first stage of the disease, the powers of sense began to be altered and disordered in both; an exquisite sensibility arose in the skin, particularly to the slightest contact of cold water; the other organs of sense probably altering too in their power, though in what manner or degree cannot be so exactly said. The looks of both kindled, the eyes turning unusually vivid; imagination, as appeared from broken hints expressed by them, was beginning to

be at work, and certain internal feelings to be higher.

The first stage of the disease, above compared in the two subjects, ran insensibly into the second; the changes in looks and sense, taken notice of, preceded the stage of madness, in which the disease put on a new and far more formidable appearance. The patients, then falling into a momentary slumber, their dreams appeared to lead them into deep horhor; they awaked scared, mistaking the place they were in, their own situation, and the persons about them. The raving madness, which immediately ensued, was characterized by horror, terror, and agonizing pain; for the imaginary situations they were led into were more dismal, the objects presented more terrible, the cruelties inflicted on them more torturing, and all in swifter alternations and succession, than ever occur to sound sense in real life.

The rapid succession of ideas was truly astonishing, and each was attended by exertions which threatened the destruction of the muscular fibres: temporary reliefs seemed to be interposed, by their being snatched at intervals, into situations solemn or cheerful, and presented with objects interesting, instead of terrible; or made spectators of cruelty, instead of sufferers of it. Thus were they enabled to support, for some time, a state of suffering, too agonizing for human nature long to sustain.

The madness of the lad, who had been a sensible boy, was in a loftier tone, and more shrieking, and it was remarkable, that the ideal dangers and horrors he was involved in, were precisely such dangers and horrors as a lad of his situation in life could have been acquainted with, or had hints of before. He endured the sufferings and conflicts of this last stage about nine hours, and died ex-

hausted with agonies of pain and great muscular exertions of strength.

The dangers of the young woman which she had to struggle with, and the horrors that enclosed her, were what in her life before she had principally feared and shunned. She bore these new sufferings about fourteen hours, and expired over-powered with pain and excessive exertions.

The spectators of the madness, in both, could not follow them through all their fancies of horrors and dangers; the transitions were so rapid that they seemed to us to be in several places at once; but though they expressed only hints of what they were encountering or engaged in, it is probable that all the dismal scenes through which they were hurried, and the dangers they underwent, were successive and somewhat connected. In short, the lad in nine hours,

and the young woman in fourteen hours, seemed to experience a great deal of whatever had formerly interested them, and suffered whatever they had formerly dreaded.

Fury, a symptom recorded by former observers of this disease, and placed in the close of it, had no place in the dreadful madness in the cases recited. There was horror, there was terror, but no fury; the exertions were to escape fancied danger, not to repel it; neither anger nor revenge seemed to operate. If they ever attempted to bite, it was not from a propensity to do injury and give pain, but it was done in the way of overcoming the restraint of waistcoat cords, or the nurse's strong wrists, which held them down in bed, and which in their diseased imaginations seemed to be keeping them in danger; and once or twice, having no other way of breaking the entanglement, they seemed ready to bite what confined

them, when it came near their mouths. If they had been excited to rage or fury, their misery would have been less; but they thought they were in danger, of which they were horribly afraid, and cruelly treated, without any desire of revenge. About the close of the scene, when all sense and intention were beginning to be effaced, some irregular twitchings and feeble jerks of some of the muscles occurred. These were all the convulsions that took place.

After what has been said, it would be absurd to waste a moment in proving, that a state of madness took place before the fatal termination of the disease; it appears, from the detail of this part of the cases, that the patients became insane, and that in a high and unusual degree; the insanity arising at the latter end of the disease, as the difficulty of swallowing, and other symptoms, did in the former part of its progress.

It seems right to call this latter stage a state of madness rather than delirium, because the ravings were in the style of insanity. Not only is the reality of the madness evident, but the character of it has been determined; it is the timid, terrified, and agonizing kind; and, as it forms a distinct species, so it is denominated canine* madness. It has been called canine madness wherever the disease has been known.

Notwithstanding the certainty of the madness in the two cases, and that mankind at large have concurred in admitting a stage of madness in the disease, there are ingenious men who have overlooked the madness in

* The epithet *canine* seems proper on a double account, both as expressing the usual source of the disease when it is communicated to man; and as it is probable that the madness of dogs, when they are affected with this disease, is, as it were, the pattern after which canine madness in the human subject forms; many necessary allowances being made for differences in species, and rank in respect of understanding.

cases presented to their observation, and others have expressly denied its occurrence.

It is not surprising that the madness should sometimes have been overlooked, since it is not impossible but persons of mild characters, when attacked by this disease, may, in the maniacal stage, put on so eager and attentive a manner, and express so little of their fears and agonies, as to seem unusually firm and distinct in their understanding, and yet be totally insane. If such characters are the subjects of the disease, the insanity may be overlooked.

Or, as canine madness in a few hours terminates in the death of the person, it is very possible for a medical observer to be absent when the insanity appears obvious. There seems no reason to exclude even a third supposition, that in certain very rare cases, where the disease falls on a constitution unu-

sually susceptible, the person may die in some violent fit of the prior stage, before the latter or maniacal one forms. As to those who deny the madness, they must either have mistaken the cases on which their conclusion is founded, or what is far more probable, it is only that they deny the propriety of the term; for it appears that some judicious observers call it a delirium, and not madness; if this be their meaning, the insanity is admitted, and it is needless to dispute about two terms which convey much the same meaning.

Convulsions, a conspicuous symptom in cases of this disease, which have been formerly published, seemed to me not to occur, till near the termination of it, and then they were but feeble and transient. The agitations, which shook the whole frame, upon making an attempt to swallow, were sudden and strong exertions, in opposition to what was experienced as an injury immediately endan-

gering life; and the voluntary exertion of certain muscles conspired instantly with the instinctive jerks of others.

The agitations, in the maniacal state, were still farther from being convulsive: the exertions of strength, here, were guided by intention, prompt from the maniacal belief of danger, or horrid encounters. The patients found it in their own belief necessary to extricate their head from the jaws of some wild beast; and the muscles, by which the neck and head are drawn to the opposite side, were put in action.

Sometimes they wanted to run from fancied danger, and then, the muscles of progressive motion were in action; sometimes, to struggle with some force, detaining them in some horrid situation; and then the force of the whole body was exerted. In a word, every mad thought and belief, produced exertions

of strength, suited to fulfil some mad purpose; and what was no less obvious, the exertions were exactly proportioned to the nature and degree of the maniacal internal feeling.

True convulsions are instantaneous jerks, or twitches of the muscles, by which the bones, or soft parts are moved; involuntarily produced, and directed to no particular end. Such were observed in the lad, when all sense and intention began to be effaced; the cheeks quivered; and the eye-brows, several times, jerked towards each other: any farther convulsions I did not observe.

If it be right as yet to draw any practical inferences, one or two maxims may be founded on the comparative statement of the two cases above proposed.—

1. That prevention of the malady is to be

undertaken only in the first interval of impending danger; but the duration of this interval cannot be exactly ascertained.

2. The most likely time for the use of remedies, whether such as have been, or such as shall be judged proper, is during that which we have called the second period of the attack, or the first stage of the actual disease; for it is manifest, that when the latter stage has commenced, so much mischief has been done, the alterations in the system have become so destructive, that little hope can be entertained of any termination, but in total dissolution.

CHAPTER V.

Appearances of the internal Parts after Death.

THE corpses of both the patients whose cases have been detailed, were laid open by dissection; and throughout the whole internal parts, the disease had left palpable and deep marks of its previous existence.

In the body of the lad, which I examined by the direction of Dr. Pitcairn, in the public theatre of the hospital, before many witnesses, all competent to judge of the facts presented, and about a day and half after his death, a little after midsummer, I found as follows:—

The whole cavity of the mouth, and internal

fauces was superficially whiter than usual, and made wet with a whitish thin saliva, standing frothy, as if in a lather, in all the natural interstices about the isthmus of the fauces. The membrane, lining the whole cavity of the mouth and internal fauces, was unusually firm, and contracted tight around the tonsils, which stood out round, hard, white, and smooth, like two buttons;—the velum pendulum palati was contracted in breadth, and the uvula appeared firmer and rounder than common.

The passages up into the nose were not particularly searched; the passages downwards were altered somewhat in capacity, and in the structure of the parts:—the pharynx was thrown into longitudinal wrinkles, and the same appearance was found in the œsophagus. The top of the larynx was unusually open, and the epiglottis appeared a little narrower, and more peaked than usual;—

the ligaments of the glottis appeared to be unusually tense. Whether the wind-pipe downwards was contracted, did not then occur as a matter to be looked into. The membrane of the mouth and internal fauces, as well as the inside of the larynx, trachea, and œsophagus, were marked here and there with dark purple-like suffusions, and in some places, coloured with distinct ramifications of small distended red vessels. The dark purple-like suffusions appearing also about the upper parts of the pharynx; a scarlet uniform redness over the whole tongue, at the roots of the paler papillæ. There were ramifications of red vessels about the epiglottis, and inside of the larynx;—and the inside of the trachea was coloured with vessels of a darker red.

When the chest was opened we found the heart rather of an under size for the body; the anterior ventricle flat; the sinis-

tro-posterior ventricle rounded, but unusually firm, even approaching to hardness. The ventricle was empty ; and the substance of the whole heart, when cut into, was pale in colour, and, as said of the left side, unusually firm ; a dark suffused spot or two appearing under the investing membrane, near the basis of the sinistro-posterior ventricle, as if from the rupture of some minute vessels in the substance of the muscle.

The great vessels in the thorax appeared with the vasa vasorum as if minutely injected, and of a vermilion colour, especially the great oblique arch of the aorta. The pericardium was slightly reddened with ramifications of the vessels. The whole pleura of the left lung of the same vermilion colour, with turgid vessels. When this lung was cut into, some liquid blood of the same light red colour oozed out of its substance.

Some adhesions, evidently the effects of a

former affection about the breast, having nothing of the gloss of the surfaces mentioned, were found between left lung and ribs. Right lung was not so reddened; but the dark red appearance of the inner membrane of the trachea, descended into the bronchia, and entered into the internal surface of both lungs.

No other traces of morbid alteration were noticed in the thoracic viscera. The lungs were perfectly free from tubercles; soft, spongy, and uniform in their texture.

The abdomen presented no less conspicuous, and I think, somewhat similar morbid alterations. The stomach, otherwise perfectly sound in all its texture, was, however, marked in the inside with broad dark purple-like suffusions, especially about its thick end; the natural rugæ deeper than usual, and nearly empty: It also seemed to me to have taken on a morbid degree of elasticity, for on expanding the rugæ, by extending a portion

of it, it returned with unusual force to its wrinkled state.

The pylorus appeared like a narrow ring projecting upwards into the cavity of the stomach, with scattered ramifications of distended red vessels, in the omentum and mesentery.

The inmost coat of the intestines was marked in different places with dark purple suffused spots; the intestinum ilium was full of rugæ; and the rugæ of the villous coat of the rectum, were deep and larger than common. This intestine being expanded, resisted and returned with an elasticity, like that of the stomach. Soft fœculent matter of the usual colour remained in the great intestines.

The liver was of the usual healthy appearance, but the ductus cysticus was constricted and almost impervious; whether there was any unusual construction of the ductus communis, was not adverted to.

The tunica propria of the kidneys was coloured with numerous ramifications of blood-vessels, containing a blackish blood; their substance was whitish, and in the infundibula a whitish gruel-like fluid was found.

The bladder was contracted, quite empty, and marked in some places with dark suffused spots. The urethra being divided at the membranous part, was contracted to the size of a corking pin.

Last of all the head was opened; and the following appearances were observed. An unusual moisture and lubricity between dura mater and arachnoidea; and the pia matral vessels appeared more numerous, blacker, and more distended than is usual in health. When the substance of the brain was sliced off, not only were numerous reddish points left on the cut surfaces, but in a few seconds dark-coloured blood issued copiously from the cut vessels,

and each point was converted into a broad blot of dark brown blood. The substance of the brain was in a small degree firmer than a healthy brain is; the ventricles of the brain contained a quantity of water, though they were not distended with it, and on its being let out, the fine membrane lining the ventricles was seen marked with ramifications of vessels, turgid with dark-coloured blood.

Morbid Appearances in the Woman.

Dr. Hamilton, when he was informed that the appearances above-mentioned had been observed in the body of the lad, with a liberal spirit of medical research, caused the body of the young woman to be retained for a similar examination. The dissection, was accurately performed by Mr.

Blizard, (now Sir Wm. Blizard,) in the operating theatre of the hospital, before a number of competent judges of morbid appearances.

The body had been dead about a day and a half, in temperate weather of the month of April, and no visible putrefactive change had commenced.

The head was first opened, and the following morbid alterations appeared. The dura mater, instead of having the healthy colour, was of a dark hue; the larger branches of its arteries, which in health are the only red arteries visible, were tense and turgid, with livid liquid blood; and the smaller branches, which are usually colourless, were filled, as if strongly injected, with blood of the same colour; the veins were distended with the same kind of blood. As a membrane, it was unusually dark coloured from being overloaded with

blood; and being lacerated in one place in the separation, upwards of a tea-spoonful of the same livid coloured blood was shed on the outside of it.

There was water between the dura mater and tunica arachnoidea, so copious that when the brain was drawn aside against the lower part of the skull, it collected in a considerable quantity between the brain and dura mater, at the edge of the divided skull.

Water was also evident between the tunica arachnoidea and pia mater, for the cellular membrane which connects the two was swollen with it.—There was also water between the pia mater and brain.—When the brain was cut off in slices, the surfaces shewed numerous brown points, which quickly spread into as many blots of the same colour, larger than any I had ever seen in any brain before.

Both lateral ventricles were distended with

a straw-coloured fluid; and the same kind of fluid was found in the other ventricles, with a watery appearance of the plexus choroides.

The basis of the brain presented an appearance altogether new to me. The four arteries of the brain were tense, and filled with the same kind of livid brown blood, and all their branches in the pia mater were much distended with the same kind of blood.

In the neck the jugular veins were unusually small, but very tense and full; the carotid arteries were also tense and small.

In the thorax, the heart was found situated unusually erect; left side unusually firm, and containing some liquid, dark, brown blood; right side of the heart flaccid and empty.—The oblique arch of the aorta smaller than usual, and contained a florid coagulum.

The whole membrane lining the larynx

(mouth not examined,) was marked with dark red suffusions; and the membrane of trachea downwards into the lungs was of an uniform red colour.

The surface of lungs or pleura was of a dark red colour, with numerous suffused patches of a more florid appearance.

Dark patches, or suffusions of a dark colour, appeared on the inside of the stomach, and here and there in the small intestines. Stomach empty, and firm in its texture. Pylorus unusually projecting into the cavity of the duodenum.

The contents of the pelvis were coloured with uniform suffusions, or purple coloured ramifications of turgid blood-vessels.—Bladder of urine was marked inside with dark suffusions, and almost empty.

CHAPTER VI.

Of the Pathology of Hydrophobia.

IT occurred to me, on seeing the patients above mentioned, and on weighing their symptoms, that the nature of the disease is not so incomprehensible as it has been said to be. Some light may be thrown on it. And as medical treatment must in many respects be but a blind or random business, unless the nature of the disease be in some degree kept in view, it would seem to be as much our duty, as it is matter of pathological importance, to enquire into the manner in which this most terrible of all diseases, affects, agitates, drives to madness, and destroys.

No more, however, is here intended, than

to offer some pathological observations upon the malady, as it occurred in the two unhappy sufferers. The disease in both, advanced rapidly, after it was formed, and exhibited symptoms to me unusually striking; it was only in certain favourable positions of the afflicted persons, and when the symptoms came on with exacerbation, that the internal alterations could be judged of, on which the symptoms depended.

The cause of the disease, is assumed to have been a poison applied by the mouth of a rabid animal, which laid dormant during the previous period of impending danger, in the bitten wound in the boy's hand, and in the chopped hands of the young woman. This period terminating, the poison began to operate; producing irritation, and not inconsiderable, in the ultimate minute arteries of the parts to which it was applied.

The irritation, about the same time, ex-

tended to the surrounding skin, and cellular membrane. It was manifested in the lad, by a blush of inflammation around the sores, and extended to the palm of the hand, where it formed an abscess. It was evinced in both, by pain arising about the hand, and extending up the fore-arm to the shoulder; and into the side of the breast. The pain complained of in the arm, proved that the small nerves there were affected; and that the whole body of the ultimate minute arteries up the arm were under a morbid irritation.

If the pain in the arm went deeper, and affected the muscles, and their tendinous vaginæ, or the larger trunks of the arteries and veins, the same inferences remain, admitting the small arteries of these parts to have been excited to this peculiar irritation. Though we cannot ascertain how the lymphatic veins of the limbs in question were affected, or what part they performed in bringing on the disease, no doubt can remain, but that they

were affected. For as far as we yet know, it is clear, that the vasa minima of arteries can never be morbidly altered without an alteration of some kind being induced in the venæ minimæ lymphaticæ, as well as in the minute blood-veins. But what the alteration precisely was, that in this first attack took place in these sets of veins of the limbs in question, we decline hazarding a conjecture.

About this time, which I have already called the first stage of the disease (the cases are not minute enough to be more exact in fixing the order in which the first alterations occurred), that the irritation and pain broke out in the hand and arm, the heart began to be affected with corresponding irritation. I know not all the little invisible steps by which the irritation reached the heart; whether it was by the irritation extending to the larger blood-vessels of the arm, and from thence to the heart, or by the transmission of the poison

through the lymphatics; but about this time the action of the heart became quicker, and more frequent; and the irritation spread to the whole arterial system. The dilatation of the arteries became every where accelerated; and their alternate contractions were performed with corresponding celerity. And there can be no doubt that the great veins terminating in the heart, were also irritated, and made quicker in their contractions.

Another alteration seems to have been produced along with this general irritation in the sanguiferous system; the heart, large arteries, and veins became permanently smaller in size. We conclude, that the heart became smaller and firmer, because the dilatations of the arteries, in their rapid series of action, were minuter and harder;—we infer, that the arteries became smaller and firmer, for the same reason, and because in their state of contractility, they correspond to that of the heart;—we pre-

sume, that the veins were smaller, because, notwithstanding the rapid circulation, the subcutaneous veins arose to no turgescence.

The dissections, as well as the symptoms, evince, that the capacity of the sanguiferous system was diminished; the heart in both being found unusually contracted and hard; the great arteries unusually diminished in capacity; and the great veins of the neck so small, as to be taken for arteries, in point of size.

This morbid condition and action of the sanguiferous system, produced a repletion and turgescence, both in the coloured and colourless small vessels; and the dissection shewed this repletion, and especially in the smaller branches of the small circles of the blood near the heart; for in both, we found arteriolæ and venulæ arteriarum, turgid, with blood; the pleura coloured with turgid red

vessels; the membrane which lines the trachea, and its whole ramifications within the lungs coloured deep with turgid red vessels.

The same repletion of blood, forced into small blood-vessels, appeared in the stomach; particularly about the cardia, where the vessels are particularly numerous, and veins large; also patches of the same kind of fulness were found in the intestines; and patches of vessels, distended with blood, were also found in the bladder of urine, and in some places, a dark central spot, indicated, that rupture had taken place in some of the small vessels of this part.

I am very far from thinking that these appearances of the minute arteries and veins around the great vessels and heart were a material part of the disease. The state of the sanguiferous system, which caused this repletion, was a morbid condition in the vessels,

and repletion itself only an effect, which might have operated rather to relieve than to oppress.

The morbid contraction, which pervaded the sanguiferous system, extended into all the membranous structures of the body ; operating in some more, in others less. The lungs seemed to be first affected with it ; the air-vessels in general becoming a little contracted, which caused a slight tightness in the breast, and offering a slight obstacle to respiration. This morbid contraction soon followed in other parts. The stomach was contracted a little ; which sometimes produced vomiting. From the inactivity of the intestines, taken in connection with the failure of appetite, there is reason to conclude that the intestines were partaking of the same disorder.

The contraction of the rectum was so

strong in the young woman, as forcibly to exclude the exhibition of clysters. The bladder of urine too was no doubt contracted, for both made but little water, and, in the lad, the urine once or twice squirted out involuntarily in drops. What further shewed that the bladder of urine was reduced to a smaller size was, that though but little urine was made, no fulness of the bladder could be felt through the integuments in region of the bladder.—Vide the Dissections.

The general tightness, it would seem, was owing, in musculo-membranous parts, to an increase of contractility in the muscular parts, joined with an increase of elasticity in the other component membranes; in the membranes, not moved by any muscular fibres, it was owing merely to the increase of the elastic powers of the parts.

What change such a general contraction in parts so important in the constitution pro-

duced in the feelings of the patients is unknown. Being general, and probably equable, it caused no acute pain; but whether we reflect on this state of living parts, or on the sad and distressed looks of the patients, we must admit that their feelings were extremely miserable. We know but little what they suffered in the different stages; but this may be remarked, that as they retained firm hearts, neither their strength nor spirits for a long time were much depressed. They could exert muscular force, and looked the danger in the face as long as they were sensible, and did not seem desponding as to the event.

One general effect (in the first stage of the malady,) of this state of the body, was manifest in a considerable suppression of wonted secretions; the mouth was rather dry, though not foul; the belly, being inactive, was probably also dry; the urine was not secreted in the usual quantities; and

what moisture was perceived on the skin was unusually liquid, and in no great quantity. Some of these symptoms even continued to the last stage of the disease.

The membranous contraction above stated, affecting the throat, whose function is performed by a nice co-operation of muscular actions, gave rise to symptoms which call for a separate consideration; these symptoms were, an extreme difficulty, and sometimes an impossibility, of swallowing, with great disorder and agitations of the whole body upon making the attempt.

Before attempting to explain the state of the hydrophobiac's throat, it is necessary first to recollect what takes place in deglutition performed by a healthy throat.—When we swallow, provided it is done in the ordinary way, the masticated morsel is laid on the tongue and carried back to its root;

in this position it bears on the epiglottis, tending to lay it down on the top of the larynx; with a jerk, the os hyoides and parts connected with it below, are pulled up and forward, whereby the epiglottis, applied for a moment to the top of larynx, is pulled forwards *from under* the morsel, and the pharynx being elevated at the same time receives it; while the muscles of the isthmus on each side by their co-operating contraction forces it back, and prevent its coming forward with the ascending root of the tongue; and the velum pendulum palati being drawn backwards and upwards, close against the posterior nostrils, prevents its rising into the nose. The pharynx, in this jerk up, is dilated to receive it; but no sooner does it enter the opening of the pharynx, which is now in a line with the os hyoides, than the pharynx contracts, and forces the morsel down into the stomach.

This complicated action is done in an in-

stant, because, were the morsel to lie on the epiglottis longer than an instant, it would too long preclude the entrance of the air into the larynx, the epiglottis being in this step of the business laid down flat on the top of the larynx.—Also, during the instant of the top of the larynx being closed, the glottis, which has its ligaments pulled tense by the elevation of the thyroid cartilage, is contracted; so that should any particle of food, or drop of liquid insinuate itself into larynx, at the sides of the epiglottis, it is prevented from descending lower than the glottis, &c.

Such, we shall suppose, is nearly the healthy function of deglutition. When deglutition comes to be performed by such a state of parts as has been noticed in the disease in question, it is experienced to be impracticable, and the attempt is dangerous. Every time the larynx is elevated for swallowing, the glottis is violently contracted, preclud-

ing the air too long, while the mouth of the pharynx shuts against the morsel. The person is thrown into instant agitations, just as if seized by the throat; for not only does he experience sudden strangling, but an insurmountable obstacle in the pharynx.

To proceed. As in a healthy state of the throat, it requires a quicker jerk of the larynx upwards, and a more accurate co-operation of all the parts concerned, when we swallow liquids, than when solid food is swallowed; so in this disease, it is far more difficult to swallow liquids, than it is to attempt solids. The preclusion of the air lasts longer, and occasions proportionally greater disorder.

The danger and difficulty of taking down food into the œsophagus, especially when liquids were attempted to be swallowed, were increased, it is probable, by the morbid scantiness of parts, whose office is to shut up every passage, excepting that into the throat, when food

or drink is received into the pharynx. The epiglottis, which should serve as an ample lid to the open top of the larynx, was found unusually peaked in the lad, and folded a little lengthwise in the middle; whereby an opening on each side, probably might admit, in the act of swallowing, some particles of drink or food into the cavity of the larynx, which would augment the agitations. No measurement was taken of the velum pendulum; so that I know not whether it remained ample enough, to stop up the posterior nostrils.

If this account proposed of the difficulty of swallowing be well founded, it must be the height of cruelty, to put miserable hydrophobiacs on trials to swallow: it is like prevailing with an afflicted person to hang himself by the neck for a few minutes, or to plunge under water.

Where the disease forms in a throat peculiarly susceptible of morbid contractions, the

obstacle and danger are more instantaneous and alarming. The stoppage of respiration anticipates the attempt to swallow. Before the cup or food reaches the lips, at the very idea of swallowing, the irregular action of the muscles begins, and the agitations are produced.

It would seem, that the muscles of deglutition are not particularly in fault; they are affected, in consequence of the hydrophobian paroxysm, but do not form it; the person can open his mouth wide, speak, vary the tone of his voice, and shift the morsel or drink from place to place in the mouth, actions performed by the same muscles, which are employed in deglutition.

What also evinces, that the muscles, which perform deglutition, are not in fault, is, that the person can swallow without difficulty, provided the violent obstacle in the glottis be avoided; which happens, when the morsel is

swallowed in a particular way ;—when it is dropped into the pharynx, without an elevation of the thyroid cartilage. In this way, the elevation of the larynx is eluded ; which is the cause of the difficulty.

The patient soon learns this easier way: when he must swallow, he takes the morsel in his own hand, and holding it between finger and thumb, carries it back past the root of the tongue, and drops it into the mouth of the pharynx ; the contraction of which, backed by its long muscles, immediately forces it down. Of all solid substances, accordingly, pills are the easiest to swallow ; they may be thrown back from about the root of the tongue, at once into the pharynx, without any necessity to elevate the larynx, or contracting the isthmus of the throat.

In this first stage of the malady, in which universal irritability excited and lessened the capacity of the sanguiferous system, and in

which the membranous structures also suffered, the sensibility of the skin became irregularly encreased, by some causes not felt in health, and was not excited by some other impressions which influence ordinary cases.

At length the disease altered its character, and the second stage commenced. The functions of the brain now became affected with increased violence. The arteries of the head became far more irritated than any other arteries in the body, determining the blood in an over proportion to the brain, at the same time the jugular veins, unusually contracted, were not capacious enough to receive the returning blood; whence watery fluid was thrown out from the irritated exhalent arteries, into the ventricles of the brain, and on the surfaces of the meninges.

This universal hydrophobiac, high irritation in the brain, produced the madness as

above described. Under this condition of the brain, all the oblong muscles of the body were thrown into convulsions, and maniacal force was exerted.

But human nature, limited in every thing else, is also limited in its power of resisting pain, and the attack of uncommon mischief. So high and uncommon a degree of irritability, agonies of pain so horrible, and such injury done to the brain, in no long time, destroyed life, and the power of suffering more.*

* Dr. Marshal's papers on hydrophobia end here; but I have thought it might tend to elucidate this disease, if I added, as an appendix, another case, which Dr. Marshal attended with me.—Editor.

APPENDIX

TO

PART II.

BY THE EDITOR.

Introduction.

IN the year 1808, so many instances of hydrophobia occurred in this metropolis, that it excited some degree of alarm in the government of the country.—And I believe it was in the winter of the same year, that the Royal College of Physicians requested by advertisement, communications from all those medical practitioners, who had within a certain period witnessed the disease.

In October of that year I was called upon, professionally, along with the late Dr. Marshal, to see a child afflicted with this dreadful malady; and we thought it our duty to comply with the request of the College. At the desire of Dr. M. in January, 1809, I transmitted to that learned body, an account of the case; with some remarks and observations upon it.

Since I have been engaged in the present publication, I solicited and obtained permission of the College, to peruse the papers which I had sent them; and most liberally they granted me the favour.

It is from these papers, together with some further details from my own notes, and from those of Dr. Marshal, which have since that period come into my hands, that the follow- observations are taken.

CHAPTER I.

ON the 28th of August, 1808, a rabid dog bit seven children, three of whom died subsequently of hydrophobia. One of these unfortunate sufferers came under the care of Dr. Marshal and myself; but before I give the details of the case, I will briefly mention a few circumstances relative to the other six.

In Clare-court the dog bit a child of Mr. Curtis's, while sitting at its father's door, No. 9. The teeth of the animal entered the right arm, just below the elbow, in four different places.

He was put under the care of Dr. Marshal and myself, and with Dr. M.'s assist-

ance I cut out the bitten parts about two hours after the accident. The wounds were also slightly touched with caustic, by way of further security. Calomel was afterwards given so as to affect the gums. I saw the child about two years after the accident, and he was then well.

In a coach-yard, Charles-street, Drury-lane, the same dog bit George Simms, aged seven years, the son of a poor woman then living at No. 28, Charles-street. The wound was severe, and under the left eye; he had also two of his front teeth struck out by the animal.

The mother informed me, that on the 30th a small piece was cut out from the wound under the eye; the wound soon healed, and he remained well till the 24th of September, when he complained of pain in his head, stomach, &c. He was taken to the London

Hospital on the 26th, where he died on the following day.

Between three and four o'clock on the same day, the same dog bit Eliza Kettle, aged three years, daughter of W. Kettle, then living at No. 9, Warwick-street, near the Hay-market, the child was in Rose-street, St. Martin's-lane, at the time of the accident. She received three different wounds about the left eye.

The wounds were dressed with common dressing by a medical gentleman in the neighbourhood, and soon healed. She was taken ill of hydrophobia on the 24th, and died on the 26th. These circumstances were learned from the mother of the child.

In Angel-alley, Long-acre, nearly about the same time, the same dog bit Thomas Peart, aged seven years, residing at No. 3, in this place. The wound was in the upper

part of the right thigh, and through the clothes. The wounds were poulticed, and he was taken to Gravesend, along with Sarah M'Kime, (whose case I am about to relate,) and dipped. This child I believe escaped the disease.

In Russell-court, Drury-lane, the animal bit a son of Mr. Levy, York-street, Covent-garden. The child was three years old, and was bitten just above the left ear. The part was cut out, and he remained well a long time after the accident.

Very near the same time and place, the dog attacked Benjamin Thorn, seven years old, the son of Mr. Thorn, Bear-yard, Lincoln's-Inn-fields. After a sharp contest, it threw the boy down, and bit him in the buttock. The wounds were cauterized, and I understand soon healed. He was well a considerable time after the accident, from the mother's report.

CHAPTER II.

Case.

THE child I particularly watched was Sarah M'Kime, aged three years and a half. She was brought to me about ten o'clock in the morning, of the 8th of October, 1808.—She then appeared extremely restless, writhing about in her mother's arms, as if in great pain.—Occasionally she screamed out, with violent efforts and looks of fear; catching hold of any thing that happened to be in her way, as if apprehensive of falling out of her mother's arms.

Her manner of speaking was singular.—Before she answered a question, she paused a little; then taking a deep inspiration, a kind of half sigh, she hurried out a short

abrupt answer, with an appearance of pain and difficulty.—Speaking often brought on a short cough, and a little phlegm into her throat. This she endeavoured to swallow, but with much difficulty, and great agitation.

Her mother informed me that she could not swallow her food, nor drink.—I offered her water, and also wine; but from both she turned away with a peevish cry, and a considerable degree of agitation:—she was prevailed upon to take a little bit of common gingerbread, which she chewed with composure; but upon attempting to swallow it, a choaking sensation seemed to be produced, with a swelling in the throat externally, and the substance was forced out of the mouth.

The seat of pain, as she expressed herself, was in the head and throat. She said she was sick in the head and throat;—her pulse was 136, and small; skin hot; tongue yel-

lowish in the middle, and red at the edges: she had passed a restless night.

She had a scar just under the edge of the left orbit, from the bite of the dog before mentioned, which she had received on the 28th of August, about four o'clock in the afternoon. At the time the child received the bite, she was with her grandmother, in Clare-court, Drury-lane; the animal leaped up, and bit her in the above-named place with an angry noise.—She was taken to a medical gentleman in the neighbourhood, who applied a little common plaster, and on the two following days a little caustic.—She was then taken down to Gravesend, and dipped in the salt-water, three successive times in a hour.*

* This the mother informed me was done with some degree of severity; the child was kept in the water until almost exhausted: she was then taken out, and when sufficiently recovered, was again put into the water, until the same effect was produced, and so a third time. This, I am informed, is the common mode of dipping.

The wound, I understand, soon healed, but a good deal of hardness remained at its basis, which had slightly inflamed a day or two before she was taken ill.

It is rather remarkable, if the observation of the mother can be depended upon, that the disposition and health of the child seemed to have undergone a considerable change soon after the accident.—Her appetite, which previously had been very little, became greatly increased, and her spirits much exhilarated. As the mother expresssd it, from being a mild docile child, she became " wild."

According to the report of her friends, on the 4th of October, she first complained of being sick in her head, which was her mode of expressing her pain : this continued with occasional remissions till the 7th, when she became extremely restless, and ill.—On this day she ate a hearty dinner ; but it was

remarked, that several times during the period of dining, "she had choakings," to use the mother's expression, putting her hands to her mouth, and occasionally was obliged to take the food out again.

The night of the 7th was passed without sleep:—she was thirsty, and asked for drink; but on attempting to swallow, the most violent agitations and choakings were caused, so that little of the fluid could be swallowed.

Under these circumstances the child was seen by Dr. Marshal, and Dr. Clutterbuck, and no doubt was entertained as to the nature of the disease.

What mode of treatment therefore ought to be had recourse to, became the subject of consideration. It was evident, that no remedy or plan of treatment hitherto adopted, that we were acquainted with,

could excite any confidence.—To resort to what had hitherto universally failed, must be useless; and death, and that speedily, the melancholy termination: it therefore appeared to us, that we were not only warranted, but it became our duty, to adopt some other plan.

The rapid progress of the malady, induced something like a hope, that if by *any means* we could suspend some of the violent symptoms, even for a short period of time, some benefit would be attained. The fatal period might be protracted to a greater distance; and time gained; and perhaps by this the disease might be weakened, or the constitution might recover power to resist or overcome the complaint.

The remedy that occurred to us as the most likely to produce this kind of truce, was some strong narcotic; and as opium had failed

in other cases, we had recourse to tobacco, the powerful effects of which upon the human system are well known.

It seemed not possible to get any medicine into her stomach; but as the full effect of the tobacco could be obtained in the form of an enema, no difficulty occurred on that account.—At the same time mercury was used.

The fullness about the throat, and great difficulty of swallowing, suggested some local application; therefore leeches were thought of.

It was half past twelve o'clock, *p. m.* before the plan could be adopted. Three leeches were then applied to the throat, during which time half an ounce of strong mercurial ointment was rubbed into different parts of the body.

At half past one o'clock she had an enema

of five ounces of the infusion of tobacco, of the strength of half a dram of common tobacco to a wine quart of boiling water. In a few minutes the child became very sick at stomach, retched much, but threw up nothing from the stomach; she only got rid of some tough frothy mucus from the fauces. The pulse became fuller, and between the intervals of retching, her breathing was quick, and she was very restless.

In about a quarter of an hour the sickness went off; she became more tranquil; looked pale and languid; catched her breath quickly, but at long intervals; her pulse became weak and slow; skin cold and damp; and she soon fell asleep.

At five o'clock we found her asleep. She had not awoke since the last report. She was breathing calmly; skin now cool and moist; pulse 112, fuller, and soft.

Nine o'clock.—We found her still asleep, and in other respects much as at five o'clock. At eight she awoke, made a little water, and asked for beer, which she looked at eagerly; but upon attempting to drink, she experienced the same kind of agitations and choaking as before.

The day had passed without her having a stool, it was therefore ordered that when she awoke she should have an opening clyster given, and two drams of mercurial ointment again applied.

October 9th, Nine o'Clock, *a. m.*—Pulse small, and now 140; skin hot and dry; tongue parched; breathing hurried; extremely restless, frequently expressing great fear, by catching hold of the nurse, and clinging eagerly to her. The breathing was singular; the inspirations were deep, but suddenly stopped, and the expirations quick and with some noise. She spoke in an extraordinary kind

of way, as if obliged to make a preparation in the organs before she was able to articulate; after a sudden and full inspiration a short pause took place; she retained the air for a few seconds, and then faulteringly uttered her expressions.

The night was passed with great and frequent agitations, and almost without sleep; great symptoms of alarm were again expressed by clinging to her aunt, who nursed her; she occasionally screamed out, but there was nothing like common delirium; now and then she squeezed her aunt's hand to her forehead and stomach, as if in great pain; and her own hands to her mouth. If she was only asked either to eat or drink, she was thrown into the most violent agitations, and made a noise as if in danger of being choaked, pinching and pulling her nurse, bed clothes, or any thing in her way. The opening clyster had produced two evacuations.

The symptoms having recurred with such increased violence, it excited some degree of sorrow that the tobacco injection had not been ordered to be repeated the moment that the child became restless; but we were reluctant to employ so powerful an agent without absolute necessity, therefore no orders were left the preceding evening to that effect. However, we now determined to resort to it again; but as the child was evidently much weaker, and as the effects of the first enema had been rather violent, it was thought better only to use it of half the strength; but the same quantity of mercurial ointment was again used.

She was seen again at three o'clock. The tobacco enema had produced no visible effect; all the symptoms were greatly increased; her pulse so quick as hardly to be numbered; countenance expressing great excitement and fear; agitations dreadful and

frequent, and brought on by the most trivial circumstance A fly happened to be perceived by her, which produced great alarm and violent agitation, attended with a choaking noise in her throat, and also a violent fighting with both her hands, as if to ward it off; even moving her from one part of the room to another seemed to terrify her extremely, which was expressed by lifting up her hands, as if to repel danger, or catch hold of any thing near her. In these fits of alarm she pinched and tore any thing she laid hold of, even her own flesh.

In this restless and agitated state she continued till about five o'clock, when she became exhausted, and lay calm, and apparently speechless, pushing the frothy saliva out of her mouth with her tongue, till a little before seven o'clock, when she died. It is remarkable that about ten minutes before her death she began to talk, and with less diffi-

culty than hitherto; some things that she uttered indicated sense, others did not. She asked for her father and aunt, then exclaimed, " bull ran into the water; here, I am coming," &c.

MORBID APPEARANCES.

On the day after her death, in the presence of Dr. Marshal, I opened the body, when the following changes in its structure were obvious.

Head.—Upon exposing the dura mater, by removing the skull, it had lost the common bluish colour, and had assumed a reddish one; the larger trunks of its arteries were distended with blood; and there was somewhat more than common moisture observed between the dura mater and the tunica arachnoidea.

The large veins of the pia mater were distended with dark-coloured blood; the capil-

lary ones were also distended but with florid blood, and so numerous on the convolutions as to give an universal red hue to the part. In several places there were red blotches, especially in some of the deep sulci about the fissuræ magnæ Silvii, from effused blood.

The cineritious substance of the brain was altogether of a darker complexion than common, and in many places had assumed a violet colour, especially on the posterior lobes.

The centrum ovale exhibited a reddish, mottled appearance; and when cut with a very sharp knife, drops of blood issued from the cut ends of the vessels, which soon spread into large blots.

There was a good deal of water in the ventricles, though they were not distended with that fluid.—There was also water all down the theca vertebralis.

The fornix, and the top of the posterior cornu were marked with large turgid blood-vessels; the corpora striata were of a dark colour, and the plexus choroides somewhat violet.

The pia mater of the pons varoli, medulla oblongata, and medulla spinalis, was of a high, florid, red colour, from which red vessels might be traced along most of the nerves; and gave them an appearance of vascularity, which we had never before observed.

Mouth, Fauces, &c.—The tongue was red, thick, and firm, and covered with a yellowish crust.—The velum pendulum palati was red, and somewhat contracted; uvula red and small; —the tonsils a little enlarged, and projecting inwards; posterior portion of the fauces, from the septum of the nose downwards, was red and thickened, with two deep fissures in it, soaked in a brownish coloured mucus.

The epiglottis stood unusually erect, but

when pressed down, was sufficiently broad to cover the tops of the arytenoid cartilages.—The lining membrane of the larynx was of a darker red colour; the pharynx was not visibly affected.—The salivary glands were rather enlarged, and of an olive colour.

Thorax.—The heart was of a roundish shape; the anterior ventricle, as usual, rather flabby; the sinistro posterior ventricle remarkably firm. There were several ounces of bloody water in the pleura. The pleura on the posterior side of the middle lobe of the right lung was ruptured, and the substance of the lung starting through it.

Abdomen.—Stomach contained about three ounces of brown-coloured fluid, with some bits of dark-coloured coagulum floating in it. Its vessels were large and flat. The instestines contained much wind.—The colon, or left side, was much contracted.—Bladder

of urine did not contain a drop of water, and was much contracted.

Since the date of the last case of hydrophobia, another opportunity occurred to me of ascertaining the morbid alterations of that malady, in the body of a child. It was a patient of Dr. Clutterbuck's, for whom, and in whose presence, I opened the body: and almost exactly the same appearances were discovered as those already described in the child M'Kime.

These cases taken together, form a tolerably strong chain of evidence respecting the disease affecting the brain.—On this point all the cases here mentioned agree, a circumstance which alone accounts for many of the urgent symptoms of this dreadful disease.

PART III.

OF MANIA.

Introduction by the Editor.

ABOUT the time that Dr. Marshal witnessed the two cases of hydrophobia, and had formed his ideas respecting the pathology of that malady, numerous opportunities occurred to him, of ascertaining the morbid condition of the brain in mania.

I will not pretend to say, that previous to this period, no alteration had ever been discovered in the brains of maniacs.—All I would contend for, is, that about this time

the general opinion of the most experienced in medicine in England, was, that this complaint left no evidences in the brain, after death, of its previous existence; but that it was altogether mental:—This opinion was sanctioned by the anatomical authorities then most respected.

I do not perceive that it is necessary towards doing justice to the departed merit of Dr. Marshal, to make any comment upon what has since been published upon this subject.—The unfortunate dispute already alluded to, rendered the opinion and its author sufficiently notorious;—nor do I conceive, that what has already met the publick eye, renders the publication of Dr. M's dissections unnecessary; for even to the present moment, the opinions of medical men are by no means uniform on this subject.

The following cases have been abbreviated,

and selected from Dr. Marshal's manuscripts. —Most of them occurred in Bethlem Hospital, the medical officers of that excellent Institution having most liberally afforded him the opportunities he wished, for these examinations; a liberality which I trust will be always exhibited to those who wish to explore a subject so momentous. It is only by repeated dissections, that our knowledge of it can be enlarged; and where can the proper opportunities be had to pursue these difficult and delicate investigations, but in the public hospitals appropriated to this disease.

CHAPTER I.

Cases and Dissections where the Head alone was examined.

CASE I.

IN 1786 an old woman died in Bethlem Hospital, who had been fourteen years upon the list of incurables:—Her mental and corporeal feelings were expressed by a miserable whining, and moaning.

When first admitted, she was plump and fat, but gradually became lean; her skin hard and brown; the knees bent and rigid; and before death her eye-sight was remarkably dim.

MORBID APPEARANCES.

Head.—The skull was very small.—On

removing the bone, a great quantity of brownish coloured water was found between the dura mater, and tunica arachnoidea. The brain was unusually firm.—There was some purulent matter in the cineritious substance of the middle lobe on the right side.—The ventricles were distended with water; and the lining membrane of these cavities had assumed a brownish colour.

The arteries at the basis of the skull were thickened, and of a white colour; and some of the veins contained air bubbles.—The fossæ in the basis of the skull were shallow; the internal occipital protuberance very large.

CASE II.

1786.—H. A. B. aged 40, a Lieutenant of the Royal Navy, fourteen years ago on challenging his Captain, had been put under an arrest, and became mad.

The character of his madness was great rage, with loss of memory. He was very furious, swearing much in sea phrases; he had great bodily strength, and a good appetite; he was so violent that he tore the clothes off his body, and lay naked and hand-cuffed day and night; his memory so far failed him, that he forgot part of his own name, and called himself G. A. B.; he had a very hoarse voice.

He became very low for some weeks, and on the day before his death he was quite rational; asked for a clergyman; seemed attentive to the service of the prayer-book; and said "he hoped God would have mercy on his soul."

MORBID APPEARANCES.

Brain.—There was a prodigious quantity of straw-coloured fluid between the dura

mater and the tunica arachnoidea—so much, that upon dividing the dura mater it ran out and wetted the floor. The sulci between the convolutions of the brain were loaded with the same kind of water, and the fissura Silvii was widened with it. A more limpid fluid very much distended the lateral ventricles, and filled and widened the bottom of the third.

The substance of the brain, and the origin of the nerves were uncommonly firm; the olfactory nerves had a fibrous appearance. A similar kind of fluid to that which was seen between the membranes of the brain, extended all down the theca vertebralis.

The hoarseness seemed to have been occasioned by the trachea being in progress of ossification; the epiglottis was thickened and contracted in width.

CASE III.

Feb. 1787. *Bethlem Hospital.*—A young exciseman was said to have been furious and maniacal at the full and change of the moon for six months; at the last of the moon's changes he accused his wife of stealing his money. He cut his own throat, and was brought into the hospital. He had been sullen some time before this period.

Sometimes he persisted that Mr. P——-n had cut his throat; then, suddenly shifting his story to sacred writ, he would say, "Guards, seize him; no further proof is wanting, do not you see the blood on the soldier's spear!"

However one day he stabbed himself in the belly; the dagger passed between the stomach and liver without wounding either. He died from this wound.

MORBID APPEARANCES.

Brain.—On opening the head some water was found between the dura mater and tunica arachnoidea, and between the arachnoidea and pia mater. There was a great plenitude of the vessels in the pia mater.

The ventricles of the brain contained water; on dividing the anterior commissure there appeared a conical cavity full of water before the infundibulum; the brain was very firm.

CASE IV.

1787.—A young woman on recovering from the puerperal fever was left in a state of mental derangement, under which she laboured for several years, and then died.

MORBID APPEARANCES.

Brain.—The veins of the pia mater were

turgidly filled with dark-coloured blood; the sinuses were loaded with blood of the same appearance; all the ventricles of the brain were distended with water, and the plexus choroides was pale, as if from being drenched in the water, which was of a yellow colour.

CASE V.

1787. A young man who had taken, and was very much reduced by the use of mercury, suddenly began to look wild, became impetuous, and continued so for some weeks, and died.

MORBID APPEARANCES.

Brain.—The veins of the pia mater were found distended with blood; generally speaking, the substance of the brain was firmer than usual, excepting the protuberances in the lateral ventricles, which were softer than

common, and of a bluish white colour; the ventricles were filled with straw-coloured water.

CASE VI.

1787. *Bethlem Hospital.*—A young man died in this hospital; he was by trade a blacksmith; gradually got unwell, sunk into a low desponding state of mind, and ultimately so much so, as to be deemed mad, and it became necessary to confine him.

The character of his mania, was that of despair: he fancied himself to have been guilty of religious crimes, beyond forgiveness; often wringing his hands; his features fixed, serious, and contracted; eyes keen, and turned upwards, he exclaimed, "O what a fire is kindled for me;" "God Almighty has told me, that he would hear of none of my death-bed repentance."

Then fancying he saw the devil, sinking

back, exclaimed, " see him there, there with his two horns."—When asked what is it, he answered, " the devil;" still looking with the most forced attention, " he is sucking my breath out."—" I have been a great sinner, indeed, but it is come upon me," &c.—During the night he fancied himself dead in his coffin.

His pupils were dilated latterly; he passed his urine and fœces not involuntarily, but without any sense of decency;—towards the last he became weak, laid quiet, and died easily.—Two days before his death he became rational.

MORBID APPEARANCES.

Brain.—There was a small quantity of water between the dura mater, and tunica arachnoidea; and also between the tunica arachnodea, and pia mater, giving the former

a vesiclar appearance. When the brain was sliced with a sharp knife, the small red points were usually manifest in the medullary substance, and spread quickly into broad, blackish blotches of blood.

The substance of the brain was uncommonly firm and tenacious; the ventricles were distended with water; the corpora albicantia protruded into the anterior end of the third ventricle; the plexus choroides whitish, as if from maceration in the water.—The fourth ventricle was much distended with water; and from the pressure of the water the olfactory nerves, had assumed a flat and fibrous appearance.

CASE VII.

April 26, 1788.—A few days ago a maniac was brought into Bethlem Hospital with her throat cut. She was a youngish wo-

man; talked incoherently and incessantly; did not sleep night nor day.

Her looks when dead.—Nose sharp; nostrils wide open; knit eye-brows; eye-lids partly open; pupils dilated, and eye-balls drawn towards the nose; giving altogether a fixed, fierce expression of countenance.

MORBID APPEARANCES.

In the Head.—Skull thin, and in many places transparent; there was a watery fluid between dura mater and tunica arachnoidea, and also between arachnoidea and pia mater. The pia mater separated easily from the brain, leaving the cineritious substance uncommonly moist; the tunica arachnoidea was rather opaque.

The ventricles were filled with a whitish turbid water; the plexus choroides whitened,

and collected into a wisp. The centrum semicirculare geminum, remarkably manifest, though soft;—and the corpora albicantia protruded into the third ventricle.

The substance of the brain was firm, and tough, and when sliced with a sharp knife, brown-coloured blots, from blood oozing out from the cut ends of the vessels, deprived the medullary substance of its white appearance.

The nerves were extremely firm and hard; the olfactory had the appearance of a piece of white tape.

CASE VIII.

In June 1788, a poor old woman was brought into the Westminster Hospital, who, in a fit of insanity, had thrown herself out of her bed-room window, when she dislocated

her wrist, broke her arm, &c, Amputation was judged to be necessary; but she died on the thirteenth day.

The character of her insanity was religious. She once fasted three weeks, in obedience to a vow she made to God: and she had great anxiety for the fate of her soul. She was sensible for two days before her death; knew she was dying, and was perfectly resigned.

MORBID APPEARANCES.

Head.—The forehead was flat, scalp almost destitute of blood, and the os frontis very small, There was a great deal of opaque watery fluid between the dura mater and the tunica arachnoidea. Within the dura mater, on the right side, were found several red patches of extravasated blood, probably from the fall.

There was also much water between the pia mater and tunica arachnoidea, giving a

gelatinous appearance to the arachnoidea. The pia mater separated easily from the brain, and left the convolutions smooth and polished.

The brain was of firmer consistence than natural, and all the ventricles were filled with water; nay, rather more, they were somewhat distended. All the protuberances in the lateral ventricles were of a pale colour. The corpora albicantia protruded into the third ventricle, which was a little widened by the water.

The theca vertebralis was filled with water; and the portions of the nerves which were within the skull were firmer and whiter than usual.

CASE IX.

Bethlem Hospital, 16*th Jan.* 1789.—In 1772, R—d C—n aged 40, was brought into

the hospital insane. He fancied himself the Earl of Errol; and in fits of fancied dignity he walked about the wards, and occasionally stamped loudly on the floor, giving his noble orders with a disordered proud look.

After remaining in the hospital for about twelve months, and getting a little better, he was taken to a work-house. Still advancing a little further towards a cure, he resumed his business, which was that of a hair dresser, though he was still flighty and odd in his demeanour.

Occasionally he would go to the work-house, come to the hospital for pills, go to Bath, and work at his business for a time, leave it, and beg his way back to London, &c. &c.

Generally when worse, he called himself the Earl of Errol; but sometimes fancied

himself Christ the Comforter. He ate and drank with a good appetite, looked fat, and seemed happy in his mind.

This winter he was re-admitted into the hospital. At times he looked remarkably ill, though he still took his victuals. He was sometimes confined by chains, not because he was vicious, but to prevent him from straying, to which he was peculiarly addicted.

Some days previous to his exacerbation, he was generally duller than usual, when he soon assumed a different deportment: made a robe of his blanket, and assumed a stately and majestic gait. He died suddenly after going to bed, without any further illness being perceived.

Expression of countenance when dead.— Face plump and fat; eye-lids rather open; pupils dim and rather contracted; eye-balls

drawn towards the nose; lips closed; lower lip a little elevated, pushing up the upper; nostrils standing widely open; the whole so associated as to give a proud look even when dead.

MORBID APPEARANCES.

Head short and round; skull uncommonly thin; an unusual ridge round the upper edge of the temporal bones, giving an appearance as if they had started. The dura mater adhered most tenaciously to the bone; so much so, that on forcing off the skull, one of its laminæ was left adhering to the bone.

When the dura mater was removed, the tunica arachnoidea presented a straw-coloured watery gelatinous appearance. In several places it was raised into little bags, especially on the most dependent parts of the brain. The pia mater separated easily from the brain, leaving the surface of the cineritious sub-

stance, pale, moist, and glossy. The tomentum cerebri was hardly perceptible, the vessels coming into the pia mater being so tender, that they easily broke.

In one of the sulci of the anterior lobe on the right side, an incipient abscess was found, which contained some thin pus-like fluid. The colour of the brain all around this abscess was a yellowish brown. The glandulæ Pacchioni were remarkably large, and firmly adherent to the dura mater.

The convolutions of the brain were prominent, and, together with the whole substance of the brain, remarkably firm. When the centrum ovale was sliced with a sharp knife, the surfaces were quickly stained with spots of blood,

All the ventricles were filled with a watery fluid. The third ventricle was widened to

the extent of half an inch. The plexus choroides and plexus medius were of a pale colour, as if bleached in the water. The corpora albicantia were manifest in the fore end of the third ventricle placed behind the infundibulum.

The medulla oblongata, and medulla spinalis were remarkably firm, contracted in size, and roughened by the firm adhesions which existed between them and the dura mater. There was a great quantity of straw-coloured water as far as could be seen down the spine, from the foramen magnum, which run out copiously when the head was inclined downwards.

All the nerves were hard and firm. The optic nerve was considerably smaller than common. The arteries, at the basis of the brain, were much diseased, white, and deprived of much of their elasticity. The carotid arteries were in some places as white as paper, were firm,

and had a leathery feel. The fossæ cerebelli shallow, and every way small.

CASE X.

June 6th, 1789.—W. G. aged 50 years, has been in Bethlem Hospital twenty years, on which account the history of his early life is wanting.

The principal feature of his insanity was pride. For several years back he had a fixed wild look, with dilated pupils. He was remarkably taciturn. If asked who he was, perhaps he would not answer for a quarter of an hour, then, with a commanding voice would say, "I am King William."

In the morning he would often walk in a stately manner to the gallery gates, and with a haughty tone of voice, call his lords to go with him to take an airing; but if by

chance he was crossed in his walk, or jostled, the passionate state of his mind made him forget his majesty, and he instantly proposed to wrestle with the patient so offending, at which exercise he possessed a considerable degree of skill.

His memory in some respects was remarkably good; for occasionally he would ask the day of the month; on being informed, he would observe, it was the day on which some remarkable event took place; and it generally happened that he was right.

He slept well, had a good appetite, and was crafty in procuring victuals to satisfy it. He would glide into another patient's cell in his absence, take his victuals, and slip into his own apartment to eat them.

At first he was remarkably clean in his person, and wore his own clothes; but of

late he was rather squallid, and covered himself with a blanket only.

About a year ago he fell from his chair in a fit. It was characterised by a rigid extension of his limbs and trunk of his body; a laborious breathing, accompanied with a hitching up of his shoulders, a turning up of his eyes, and great insensibility.

Ever after the fit, he was weak, and lost much of his gaiety; was not much inclined to walk, and when he did, dragged one leg after him. He also became sleepy; but still took his food.

About three months ago, his body and lower limbs became anasarcous; but by purging, &c. the anasarca went off, when he became more stupid and incoherent; and his eye-sight dim. Yesterday he had another fit, of which he died in about an hour.

General appearance of the dead body.—Body rather fat; skin sprinkled with petechial-like pimples; head small; nose a little awry; general expression of countenance sad and eager.

MORBID APPEARANCES.

Head.—The skull was uncommonly thin, and the dura mater very slightly adhered to it. At the right side of the longitudinal sinus, near the vertex, there was a red nipple-like process of the dura mater which was received into a fossa of the skull, at which place the skull was remarkably thin and transparent.

The cellular portion of the tunica arachnoidea was loaded with water; the vessels of pia mater pale coloured, and hardly contained any blood. The convolutions were very flat, and the sulci almost effaced.

The substance of the brain was remarkably

firm and tenacious; when the centrum ovale was cut into with a sharp knife, hardly any red blots appeared; the medulla oblongata felt hard, and the olfactory nerves had the appearance of pieces of flat tape.

The lateral ventricles were very much distended with a watery fluid, so much so, that the fluctuation was perceptible from the centrum ovale: they contained as much as twelve ounces of a brown-coloured water; the descending cornua were so dilated, as to be capable of receiving the thumb of a largish hand; the posterior cornua were pushed back to within an inch of the skull; and there was some black coagulated blood in the bottom of the right lateral ventricle.

The protuberances in these ventricles were very prominent, and the lining membrane was so altered in its texture, that it was become firm and resisting.

There was a considerable quantity of black grumous blood in the right lobe of the cerebellum, and some livid blood extravasated under the pia mater, posteriorly on the medulla spinalis.

There was water in the whole theca vertebralis;—the ligamentum longitudinale posterius et anterius, and the periosteum of the vertebræ, readily separated from the bone.

The four arteries of the brain were in progress of ossification: numerous patches of ossific matter were deposited in them, and the intervening portions of the artery were white, and more friable than common.—These appearances were continued to the most minute branches. The whole extent of the carotid arteries, down the neck, was in a diseased state, being whiter than common, and having a kind of leathery thickening.

CASE XI.

Bethlem Hospital, Sept. 20, 1789.— C— H—, aged 34, has been in the hospital for about six months :—she was formerly a servant, but through the misfortune of losing her senses, became chargeable to the parish, and was sent to Bethlem.

Night and day she was found constantly awake, and almost always in her solitary cell, sitting with her knees bent up, and her head forwards, making a miserable whining noise, and incessantly spitting out saliva from her mouth upon the bed on which she sat.—The pain she felt, was not unfrequently expressed by her knocking her head against the wall.

She never spoke, nor made any signs for

food;—indeed, she would not begin to eat, when it was brought to her, until the first few morsels were forced into her mouth; when she would finish a hearty meal.

The common offices of nature were not performed involuntary; but when, and where nature indicated. She died in the night.

MORBID APPEARANCES.

Head.—There was a black contusion on the side of the head, from beating it against the wall.—The head was small, and an unusual hollow in the temporal bone on each side.

There was a little water between the membranes of the brain, at the upper part of the head; and the substance of the brain was firmer than common.—The ventricles of the brain were filled, though not distended, with a watery fluid.—The lateral ventricles ran backwards almost to the occipital bones.

The membranes at the basis of the brain were soaked, and swollen with water; transparent and white filaments were hanging suspended in it from the vessels and nerves.

The nerves, as is usual in such cases of mania, were hard and strong.—The theca vertebralis was found to be full of water, and the four great arteries which supply the basis of the brain, were beginning to be ossified.

CASE XII.

In 1790, a cheesemonger's porter, after drinking some beer with a comrade one evening, stabbed him in the back with a knife, as they were walking home together, without any provocation being given.—After committing this act he ran off, and being stopped by the watchman, he stabbed him also.

He was committed for the assault, found

insane, and retained in Newgate, where he hanged himself with his neck-handkerchief.

MORBID APPEARANCES.

Brain.—There was a good deal of moisture between the membranes of the brain, and the usual degree of gelatinous appearance in the cellular portion of the tunica arachnoidea, so frequently observed in maniacal cases.

The brain was firm;—numerous and large bloody spots appeared, on cutting into the centrum ovale; all the ventricles were distended with water, and the lining membrane was so strong, as to bear being scraped with the handle of the knife.

CASE XIII.

Bethlem Hospital, July 30, 1790.—J— G — a farmer's servant, was admitted into the Hospital sixteen years ago, had afterwards

been discharged as an incurable;—their being no vacancy on the incurable list.

He had been very violent, and dangerous, in the first few years of his insanity; and when in the country, had attempted to kill a man and his wife, who had the care of him.

He was out of the hospital for about two years, before a vacancy occurred, when he returned a kind of idiot.—He stood with folded arms, stooping forwards, nodding his head, with fixed, unobserving eyes: he seldom changed his place, or position, and was very slothful.

His memory was slow, and served him but on a few occasions: he was obedient to orders.

He made no complaint of being ill, though his appetite had declined for three months

before his death; and his face became œdematous, as is often the case in the last stage of this malady.—When questioned about his health, he made no answer.—Yesterday he breathed short, and had a bad pulse, and died in the night.

MORBID APPEARANCES.

Head.—There was water, though not so much as I have seen between the membranes of the brain: and the ventricles were somewhat distended with the same fluid.—In the plexus choroides, on each side, were found a number of amber-coloured hydatids of about the size of a common pea.

There was a great deal of water in the theca vertebralis, and the vertebral arteries were much diseased.—The skull was shallow, and remarkably thick.

CASE XIV.

In December, 1793, D. D. died in St. Clement's Work-house, aged fifty-two:—Originally she was in trade, but became indolent, neglected her business, and fell into poverty.

She was almost constantly in bed, and so indolent and nasty, that she would not stir to obey the common offices of nature: yet she had such a propensity for money, that at night she would get up, and steal it from the other patients.

MORBID APPEARANCES.

Head.—The skull was very shallow, and forehead flat.—There was water between the membranes; and the cellular portion of the tunica arachnoidea was filled with it.—

The pia mater separated easily from the brain, leaving the convolutions firm and glossy.

The medullary substance was firm, and rather of a brown colour; the ventricles were distended with water; the plexus choroides pale coloured, and the theca vertebralis filled with water.

CASE XV.

1793.—G. S. aged fifty years, has been in Mr. Miles's house for four years, where he died: He was formerly a serjeant of marines: he was tall, and well-shaped in his body, but had a striking vulgarity in his looks:—he was a man of great courage, and had been frequently wounded in the service of his country.

Previously to coming into this house, he was received into Greenwich Hospital, with

fits: when they came on, he was always impelled to strike any one who happened to be nearest him; and his blows were very violent; he soon fell down in hideous convulsions, foaming at the mouth. These fits deprived him of his reason;—they ever afterwards continued, and had the same influence over him.

He was a great eater, and was always seen with a large piece of bread stuck in his bosom: he used many stratagems to obtain meat and bread from the other patients.

He was not conscious of his state of confinement; his mind was constantly busied in the service of his country, retracing all his former scenes and actions. He was not always obedient to the orders of the keeper, but if the phrase "all hands a-high," was given with its proper tone, as if electrified, it instantly roused him to a sense of duty.

MORBID APPEARANCES.

Brain.—The dura mater was of a sallow, white colour; and along the side of the superior longitudinal sinus, were found a number of small tubercles. There was more moisture than is usual between the membranes; and the tunica arachnoidea had the appearance, as if it had been lubricated with transparent oil;—the pia mater peeled easily from the brain, when the convolutions appeared firm and flat.

The substance of the brain was very hard; the ventricles distended with water, and all their parts so firm, as to keep their distinguished form, after the water was evacuated. —In the plexus choroides, on each side, were found several hydatids.

CHAPTER II.

Cases and Dissections where the Head, Heart, and Arteries were examined.

CASE I.

1793.—J. T. aged 45, died in Mr. Miles's mad-house of a mortification in his feet; formerly he had been a soldier, and had lost one arm in the wars.

He was idiotical, and very obscene; very fond of spirituous liquors, and remarkably lascivious. After having been brought from Chelsea Hospital into this house, and even at the point of death from the mortification, he would talk with gayety of his former freaks with his ladies.

A few hours before his death he became quite rational.

MORBID APPEARANCES.

Thorax.—On opening the thorax a great deal of yellow-coloured hard fat presented; on opening the pericardium a considerable quantity of water was found in it. The shape of the heart was tolerably good, but its substance remarkably tender, flabby, and of a brown colour.

The auricles and communicating veins were much distended with dark-coloured blood, and those going upwards were tensely filled as far as the sinuses of the dura mater.

The aorta was capacious, and its muscular coat thicker, denser, and whiter than usual, and contained a yellowish soft coagulum; its inside was mottled white and yellow; and thin films of fragile calcareous matter were every where felt through the membrana intima.

This mottled appearance extended through the whole length of the carotid arteries as far as the cavernous sinus, and a long yellow coagulum was drawn out of the carotid artery in the pars petrosa.

Brain.—The vertebral arteries within the skull were also thin and similarly coloured; there was a great deal of water in the theca vertebralis; and the first portion of all the nerves was very tough, hard, and very white.

There was a great deal of water in all the ventricles, and the plexus choroides on each side had a bleached appearance.

The surface of the cerebellum, from the great pressure of the water from within, and also from without, for there was more than a pint of water contained in the skull, appeared as a smooth mass of pennated medullary substance; the whole substance of

the cerebellum was remarkably dense and elastic.

There was transparent water in the cellular portion of the arachnoidea, in the sulci of the brain, and many of the sulci were widened by its abundance; the pia mater peeled clean and easily from the convolutions, which were much flattened by the pressure of the water; the tunica arachnoidea appeared to be rendered opaque and thickened.

The cortical substance of the brain was altogether firmer than I had ever seen; and the medullary portion tough beyond what is usual.

CASE II.

Sept. 12*th*, 1789.—P. R. aged 50, has been twenty years in Bethlem; he became

insane at about the age of twenty-five; he was by trade a tailor.

In the day time he moped about, interfering with no one, and occasionally laughing to himself; but if any one got in his way, or happened to jostle him, he became extremely violent, swearing at, or even striking the offending person.

If asked how he was, he would pause a little, then open his mouth wide at the corners, and say "ah!" If provisions were brought to him he would eat, but he never asked for them.

For about a year before his death he was constantly in bed, and always laid in a round posture, so that his legs were drawn up, and his knees rigid. His antipathy to motion was so great, that if he was forced out of bed, and the attendant only left him for a

moment, he dropped down, when it again became difficult to rouze him. He slept well.

MORBID APPEARANCES.

Head.—His head was long, but narrow; on removing the scalp a circular depression was observed in the skull about the middle of the longitudinal sinus, as if he had been trepanned there when young. The perforation was filled up with thin bone, to a small central deficiency, where something like periosteum completed it.

The skull was thin at the sides and thick at the fore and hind head. The dura mater was tender, being easily lacerated and separated from the bone. There was a brownish watery fluid between the membranes; when the pia mater was pulled from the brain, water stood in pools in every sulcus, and

more particularly in the fissura magna Silvii; water was every where copious round the cerebellum, and between the membranes of the medulla oblongata; the veins and sinuses were filled with dark blood.

When the centrum ovale was cut into, very few but large blots of blood appeared, and the brain at this part was very firm.

The ventricles were ample, and distended with much limpid water; the mouth of the infundibulum was tough, and retained its shape after the water was evacuated. The septum lucidum was tough and expanded like tender leather; the plexus choroides pale; and the pia mater and plexus medius peeled off easily from the pineal gland.

The fourth ventricle was filled with water, and the nerves were firm and strong, and appeared like tapes and cords.

The great arteries at the entrance of the skull were spotted with white spots which were more friable than the other portions; all the arteries of the neck and in the thorax were white, thin, and tender.

Thorax.—There was more than a pound of bloody water in the pericardium, the inside of which and the surface of the heart were roughened by inflammation; there was little or no blood in the heart, its muscular substance was dry, and the auricles, like the veins and sinuses of the head, were filled with dark-coloured blood.

The nerves of the neck were whiter, dryer, and harder than common; the left lung, though there was no cough, was studded with a grey cheesy-like substance.

CASE III.

Bethlem Hospital, Sept. 28, 1789.—J—n P——t had been eight years in the Hospi-

tal, and six years previously in a private madhouse.

At first he was extremely violent so as to require being chained; since this he has been sometimes in a lofty and violent temper of mind, at others low and desponding. When the insanity took a high tone he talked much of his great relations, who he said were some of them lords; in this state he could not bear contradiction, got into a violent passion, and offered personal violence. When he was low spirited he was remarkably civil and quiet, generally keeping his bed.

He was very crafty, and used much flattery to the keepers, he called them "fine men, gentlemen," and especially if he wanted any little indulgence; but when his complacent looks and genteel expressions did not avail him, he became revengeful, made up some plausible story against them, and slily told it to the steward.

While he retained strength he was very overbearing in the wards, often struck the other patients, stole their victuals, &c.

To one of the keepers he had a peculiar antipathy, because he prevented him from interfering with the other patients; but P——t took ample revenge by giving him a dreadful thrashing one day, when he met him alone, and at a time when the keeper was weak, having just recovered from a fever.

When fresh patients came into the house he always introduced himself to them; he was very civil to them, and gave them every information and assistance respecting the customs of the house; but after having gained their confidence he tried to get their money from them, which if he could not do by any other means, he had recourse to stratagem to get possession of it.

Before he was very ill he was neat and clean in his person, and remarkably fond of the women; he felt flattered and happy by imagining that they admired him; he used to send presents of fruit, &c. to a female patient in the house. He was very fond of small-beer, a moderate draught of which would intoxicate him.

For some years he complained of a violent pain in his back, which rendered him incapable of walking much; he had a bad cough and spitting for a month before his death; his head became much more clear, and he answered questions distinctly.

MORBID APPEARANCES.

Head.—There was much moisture between the dura mater and the bone; the cellular substance of the tunica arachnoidea was swollen with water, and rendered opaque; the

substance of the brain was firm, and when the centrum ovale was cut through with a sharp knife numerous bloody spots appeared.

All the ventricles contained a good deal of water, though they were not much distended with that fluid. The plexus choroides was pale-coloured, and there was a great deal of watery fluid in the theca vertebralis. The arteries of the brain were thin, pale, and very tender.

Thorax.—The left lung adhered to the pleura of the ribs, and there was a large abscess in its substance filled with brown, slimy, purulent matter. The right lung was not quite sound.

The heart was of a very small size; its substance thin and remarkably tender; and the coronary arteries were ossified.

Abdomen.—On opening the abdomen a large lumbar abscess was discovered on the right side of the spine; the containing bag presented a smooth convex surface seated on the lumbar vertebræ; the cyst seemed to be formed of peritonæum and condensed cellular membrane, thickened and augmented by a succession of superadded inflammatory crusts on the inside.

CASE IV.

March 10, 1790.—A—w J—n, a decent dressed man, about 40 years of age, was found sitting at a door in St. Clements's parish, in a very ill state of health; he was taken into the Work-house, where he soon died. He was well known in the parish.

In the early part of his life he was a woollen-draper, but became a great drunkard, neglected his business, and was obliged to leave off trade.

The character of his insanity was that of an argumentative wrangler. In the alehouse, where he almost constantly was, in argument he became extremely violent; it was not enough to silence his antagonist, he then became more excited and furious. He boasted much of his knowledge of history, and of his other great abilities.

MORBID APPEARANCES.

Thorax.—Heart was fat, very thin, tender, and of a pale colour; the basis of the semilunar valves of the aorta was ossified; aorta small, white, and rigid, with patches of bony matter under the membrana intima.

The carotid arteries were remarkably small, not larger than is generally observed in a boy of about 12 years old, and they were of a yellowish white colour. There were also fragile films of bony matter under the mem-

brana intima, about the division of the carotids into external and internal.

Head.—The basilary arteries were in progress of ossification; there was water in all the ventricles of the brain; and the membrane of the lateral ventricles was almost as strong as peritonæum.

There was water between the covering membranes of the brain, and the tunica arachnoidea had a jelly-like appearance.

CASE V.

1790.—B—e, aged 30, died in Bethlem Hospital. His mental affliction was a kind of idiotism attended with the most violent pains in his head.

The paroxysms came on suddenly, and quite unexpectedly, when he exclaimed, "my

head ! my head !" he then hung it down, knitting his eye-brows. He lost his eye-sight, and became for a short time almost totally stupid.

There were frequently great tremor and agitation in the whole of his body, and he not unfrequently indicated pain by placing his hand upon his heart.

MORBID APPEARANCES.

Head.—The vessels of the brain and its membranes were loaded with a dark-coloured blood, and there was water between the membranes; the ventricles were widely distended with a clear watery fluid, which ran freely from one ventricle into another; there was also a great deal of water in the theca vertebralis.

Thorax.—The heart was of a small size, and the sinistro-posterior ventricle felt hard. The cellular membrane, which connects the

adherent portion of the pericardium to the heart, was soaked with a straw-coloured water, giving it a gelatinous appearance; the pericardium contained a good deal of amber-coloured water.

The aorta was small in size and thin, its inside was singularly studded with white and hardish pimple-like elevations; the carotids were also thin, and in like manner mottled.

The lungs were of a light grey colour; there were some hard white lumps in the backward portions; anteriorly they adhered to the ribs; the stomach was contracted; the intestines sound.

CASE VI.

In Sept. 1791, C—s M—d, aged 60, died in Bethlem Hospital. He had been a gamekeeper; night and day were passed without sleep, he was almost constantly hallooing,

" hillocks! hillocks!" He was very violent, throwing his bowl, or any thing he could get, at any one who opened the door of his cell, and if he could catch hold of him he would endeavour to strangle him.

His appetite was bad; face pale; eyes staring, and pupils dilated. For some time before his death he became more calm and sensible; he complained of rheumatic pains all over his body, and began to droop.

MORBID APPEARANCES.

Head.—Face pale and wrinkled; pupils dilated; head mis-shaped, highest part at the bregma; the dura mater separated easily from the skull; and there was a great quantity of water between the membranes of the brain; the ventricles contained water, though not so much as to distend them; the plexus choroides on each side was of a pale colour, as

if bleached in the water; and the pia mater separated easily from the tubercula quadrigeminæ.

The substance of the brain was soft, and the cerebral arteries generally large and thickened; one of the internal carotid arteries was thin and white, and the other becoming friable.

Thorax.—The heart being surrounded with water was pale, soft, and flabby, with bony substitutions in the coronary arteries; the aorta was large, thick, and ossified in various places.

CASE VII.

In 1794, M—a P—y, a poor farmer's wife, died in Bethlem Hospital, insane, aged 40. During the time she was insane her body was lean, her countenance earnest and staring, with dilated pupils. She never

seemed to sleep, was not mischievous, and had no desire for food.

Her great anxiety was to go home, and about her soul; these subjects absorbed most completely the small remains of her mind, so that she became deaf to all questions and entreaties.

Her pulse was always unequal and irregular, beating one, two ; one ; one, two ; one, two ; one ; one, two, three; &c. Some time before death she became very weak, her fingers stiff and cold, and she died quietly.—The expression of her countenance when dead was that of grief and despair.

MORBID APPEARANCES.

Head.—The skull was very small ; the lateral depression at the temples deep ; the pars squamosa of the temporal bones extending far over the parietal bones.

The scalp was dry, and the muscular fibres of a pale brown colour; the pericranium peeled easily from the bone.

The larger arteries of the dura mater were filled with black blood, though the other parts of the membrane were unusually white. There was a little moisture between the dura mater and tunica arachnoidea; and there were bags of straw-coloured water in the cellular portion of the tunica arachnoidea, especially in the deeper furrows of the convolutions.

The pia mater separated easily from the cortical substance of the brain, leaving the convolutions glossy, and with firm angulated edges; the brain and the nerves within the skull were very firm, except the middle lobe on the right side, which was soft.

There was a good deal of water in the ventricles, and a great deal in the theca verte-

bralis ; the corpora albicantia had a soft watery appearance.

Heart.—The muscular substance of the anterior ventricle was firm, but very thin, and of a brown colour ; that of the sinistro-posterior ventricle thin, very tender, and of nearly the same colour ; the carneæ columnæ of this ventricle were marked with dark extravasations of blood ; there were also numerous spots of extravasated blood within the membrana intima, which were of a pink colour ; and the valvulæ mitrales were ossified, as were also the aorta and its valves.

The carotid arteries were of a white colour, and their muscular portion was becoming hard, white, and fragile, and had nearly lost all fibrous appearance ; the internal carotid arteries in the cavernous sinus were very tender, but not ossified ; the anterior and posterior clinoid processes coalesced together.

PART IV.

OBSERVATIONS ON THE NATURE OF MANIA.

Introduction by the Editor.

DR. MARSHAL'S attention was not only directed to the disorganization of the brain in cases of mania, but was also much occupied in considering the theory of that disease.

His remarks upon mania are numerous; but as they were penned down as they occurred to his mind, excited by the cases which came under his notice, they cannot be presented in that systematic order in which he would have moulded them, if he had lived to finish the work; yet, they were

the result of his mature deliberation; and are, in many respects, so original, as, in the Editor's opinion, to deserve the consideration of the medical profession.

The Editor of the present work has therefore taken upon himself to make a selection of these remarks, and has given them, as nearly as possible, in Dr. Marshal's own words, but with such arrangement, and with such connecting matter, as seemed suited to convey Dr. Marshal's ideas. For this arrangement, and the few paragraphs that were necessary to make the connection complete, Dr. M. is not responsible.

On this point the Editor has to rely on the indulgence of a liberal profession, if it should deem the selection deficient in that order and precision, which are so desirable in all subjects of science.

The following pages will consist, first, of Dr. Marshal's ideas of the functions of the brain and nerves, and afterwards of his opinions upon the nature of mania.

CHAPTER I.

Observations on the Functions of the Brain and Nerves.

THE primary functions of the brain and nerves consist in their rendering us conscious of the existence and properties of surrounding objects, and while in this world, of the existence and properties of ourselves.

For although things exist with all their properties independant of us, and therefore when a man perishes, not the smallest particle of surrounding nature is annihilated, or in the least unhinged by his dissolution ; yet it is by our possessing brain and nerves that the independant existence and properties of surrounding objects come home to our perception. Matter of the same form with that

of the human body (excepting the brain and nerves) might exist, and might be animated, but without these organs it would be quite unconscious of its present existence, or of the properties and various conditions of surrounding nature.

Living systems destitute of brain, shew no signs of their being impressed with any feeling or consciousness. The polypus, according to the observations of Haller and others, has no brain or nerves; accordingly, it appears to perform the motions requisite to its preservation, by a necessity of which it seems to be unconscious.

Vegetables are also living systems, but having no brain, they appear destitute of sense. They take in, assimilate and apply nourishment, perform secretions, generate or separate heat, preserve their own substance from putrefaction, perform motions in con-

sequence of irritation, and produce prolific seed. But all these actions seem to be performed from blind necessity, and without any sort of intelligent consciousness.

But in living systems actually furnished with brain and nerves, so long as they are entire, and in that condition which health gives and requires, the animal remains actually sensible of the existence of surrounding nature, or susceptible of that consciousness; but when injury is done to the brain, the consciousness of the impressions, resulting from the contact of external matter (of which kind are both light and air) is according to the degree of injury, perverted, suspended, or extinguished. Yet injuries inflicted on other organs of the body in nowise affect sense, unless when they symptomatically involve the brain. The same comparison, leading to the same conclusion, may be made in

respect to the diseases of the brain and other parts.

It must be admitted, that in order to produce peculiar sensations, there must be the health and entire structure of the nerves in connection with the brain; for to destroy the extremities of nerves, destroys the peculiar sensations which these nerves contribute to exhibit, when remaining sound. If the retina be injured or destroyed, vision is impaired or lost; if the ultimate distribution of the olfactory nerves be destroyed, there is no more smell.

Although light should be properly refracted, yet if should fall on the optic nerve before it expands into retina, it would not occasion any vision, nor would odours, if conveyed to the olfactory nerves within the skull, probably, give occasion to smell; nor is it

probable, that sapid substances would excite a sense of taste, if applied to any point of the nerves of taste other than the nervous papillæ of the tongue.

But necessary as the extremities of the nerves are to the production of peculiar sensations, they cannot be reckoned sentient: for, if their connection with the brain be interrupted by compression, no peculiar sensation arises from impression on the extremities: but, if the compression be removed, the power of giving the peculiar sensation returns.

Yet though the compression of the nerves interrupts or destroys the peculiar sensations usually referred to their extremities, a sense of feeling in different modes subsists between the part compressed and the brain; so that the power of contributing to a certain degree of sense, which would be lost between the ligature and the extremities, survives between

the seat of the injury and the brain. The sort of feeling so remaining, is sometimes a sense of obscure touch, sometimes a sense of pricking, or a sense of pain.

We therefore conclude, that there is no manner of sensibility in nerves, but in connection with the brain. That the power by which we see, hear, feel, &c. is a power of the brain, the nerves being only a conditio sine quâ non of particular sensations referred to nervous extremities, and the brain being rather the efficient cause of these sensations, and giving susceptibility to a certain degree, at least, to that portion of nerve left connected with it:—may it be added, that independant of any conditional impression on the nerves, the brain itself, from impressions immediately on itself, is sentient: for, let any set of nerves whatever be destroyed, or let no particular impression whatever be made on the nerves, a sense of head-ache,

vertigo, noise, colours, &c. may be, and often is, produced as a disease.

The sphere of cerebral power exerted in conjunction with, or in consequence of impressions made on the nerves, is great. By the brain being affected through the medium of the eyes, we are made acquainted with the colour, figure, magnitude, and motion of external things placed at a greater or less distance from us. This is the sense of seeing, an inlet to human knowledge, which is at once necessary to self preservation, and opens a view of the striking and beautiful phenomena of nature.

The existence, degree of distance, hardness, and several other interesting qualities of objects placed at a distance, seen or unseen, come home to our perception, through tremors of air affecting the brain through the ear. This is the sense of hearing, by which we are warned of unseen danger, perceive operations of nature, though unseen,

and comprehend the signs or words, employed by our fellow-creatures to express their sensations or passions.

The qualities of sapid substances which we are interested in perceiving, their sweetness, acidity, bitterness, saltness, and aromatic nature, are perceived, when these qualities, through the medium of the tongue, excite the proper sensations in the brain. This is the sense of taste; the qualities suggested by taste, constitute a sort of index of the salutary, innocent, or pernicious nature of substances presented as food, rather than point out the actual composition of these substances. This sense seems given chiefly with a view to the preservation of the animal; for by it man is induced to take in wholesome food, and is led to avoid improper or hurtful food; wholesome food being in general agreeable; and improper, or hurtful aliment being in general disagreeable, at least to taste not corrupted by luxury.

It is a common, yet curious, observation, that the same nerves, which are susceptible of impressions from sapid substances, are also nerves of touch; so that a substance in the mouth is both tasted, and its superficial qualities of hardness, smoothness, &c. perceived. The conjunction of both senses seems requisite in the tongue, since a substance taken into the mouth may be as hurtful from its superficial qualities, its roughness, angles, edges, &c. as from its acrid, saline, or putrid qualities.

The nourishment and refreshment of the body are further assisted by our being enabled to perceive certain qualities of sapid substances before we take them into the mouth. This is done by volatile particles of the substances affecting the internal parts of the nose, and through these the brain. Thus the sense of smelling is auxiliary to taste, as it admonishes us of the quality of sapid substances, before we too freely make use of them;

as it induces us to take in proper food, which is generally of a pleasant smell, if it smells at all; and as it keeps us from unwholesome food, which is generally of a disagreeable odour.

Odours are the object of this sense; and different odours affecting the brain through the nose, produce different sensations of smell, as either pungent, sweet, or putrid, &c. These suggest, in some degree, what may be expected from swallowing or applying the substance, but express nothing concerning their internal structure or composition. Air is the vehicle of odour.

To assist vision, and to make amends for its defects, there is a consciousness implanted in us of the contact of external things. The nerves, which receive the impression from which this consciousness results, are almost universally present in the body; and if they remain every where free and connected, in a

healthy state, with an entire and healthy brain, the contact of external things, and internal changes ,are perceivable in almost every part of the body.

Several different modes of feeling may be marked; 1st, By the contact of external things, with the extremities of the nerves of feeling, we acquire a perception of the hardness, softness, roughness, smoothness, heat, cold, figure, magnitude, pressure, and weight of whatever is within our reach. This is the sense of touch, properly so called—the most correct of all the senses, and the most extensive, subservient to self-preservation, and supplying man with exact and enlarged conceptions of what takes place in nature.

2dly. Certain parts of the body occasionally fall into a state which gives rise to a particular mode of feeling, followed by certain propensities. These give occasion to actions,

which being exerted, relieve the propensity. Thus a certain languid state of the circulation through the lungs, gives a peculiar uneasy sensation that produces yawning. A sense of irritation in the nose, gives rise to sneezing; a sense of irritation about the glottis, to coughing; a sense of tickling of the skin, to laughter, &c.

Some of these peculiar modes of sensation have names, and some have not. Like other sensations, they admit of no definition. Their final intention is evident, since they tend to throw off the offending cause that produces them.

3dly. Certain parts of the body are constantly, if in a healthy state, possessed of a peculiar susceptibility of impression. Thus the glans penis, and some other parts, are endowed with a peculiar sensibility.—The final cause of which is also evident.

4thly. All the parts of the body, supplied with nerves, are susceptible of an impression which gives occasion to sense of pain. The impression here arises, generally, from whatever hurts, destroys, or forms disease; and the sense excited by it makes us avoid injury, and take pains to get rid of disease. By the by, taking man as he is, and admitting the laws of nature at present established, to be wise and good, pain is not an evil, but the result of a wise and beneficent Providence; since it tends to preserve our existence, more directly and more unerringly than any other mode of sense we are endowed with. The exciting cause of pain is the impression of injury, or disease; the efficient cause, the connection of the part so injured or disordered with the brain; and the final cause, the preservation of the animal.

These are some of the modes of feeling: each of the other senses is also a genus, under

which are included various modes of the sensation referred to the organ.

When we compare the different senses together, two or three observations occur to us; one is, that the first four senses take place only when certain due degrees of impression are made on the extremities of the nerves distributed to that organ: if the impression is too slight, no peculiar sense arises; if it exceeds in measure, instead of the sense of seeing, hearing, &c. there is merely a sense of pain. Thus the first four senses, when their organs are injured, agree with the sense of feeling.

Another observation is, that as the sense of feeling arises from impressions made in those parts of the body, so it is more difficult to destroy than the other senses. When the extremities of the nerves of the other senses are destroyed, peculiar sensations con-

nected with them also cease, as was mentioned above: but the remaining body of nerves retains a sense of feeling; and the extremities of nerves appropriated to feeling only, being destroyed, the extremities of the portion left resume the peculiar susceptibility of the original extremities.

In the case of W. Scott, whose penis was carried off by a gun-shot, the stump of it, which was even with the skin of the pubis, resumed the peculiar sensibility of the glans penis; also the cicatrix of sores in other parts of the body is susceptible to impressions of touch.

But extensive as the sphere of sensation is, and how much soever of the universe it unfolds to human comprehension, the powers of the brain are not confined to mere sensation. The brain is likewise the corporeal organ, whose health and entire structure are neces-

sarily connected with all intellectual powers, all internal senses, and all the passions.

Memory depends on the brain; a fundamental power, in respect to other intellectual operations. We cannot, after living but a few weeks in the world, exposed to the contact of surrounding things, and to light reflected from their surfaces, avoid recognising sensations, which turn out to be mere repetitions of similar impressions, from the same forms of matter. We recognize the similar sensations, and feel in ourselves that formerly we were affected exactly in a similar manner by the impression on the organ of sense. This recognizing of sensations, and belief of their being repetitions, happens by the same physical necessity with which the first sensations of the kind we ever had arose from their original and first impressions. We cannot but taste when sapid substances are applied to the tongue; nor can we pass by the con-

sciousness that there is a repetition when the same taste is again renewed. This is the simplest form of memory; it occurs in an infant a month old, when it begins to recognize its nurse.

After living longer, continually affected with the true sense and impressions of external things, and after being masters of more certain experience, we naturally improve upon the simple memory of a single sensation, and acquire a power of recalling a train of sensations in the order and circumstances in which they were originally perceived. They are recalled, with a belief that they were formerly impressed upon us, by objects no longer affecting us. This is memory, in a greater perfection; a faculty which, spiritual as it may seem, is seldom exerted, but when it sets off from the advantageous ground of some resembling, contrary, or otherwise related actual sensation of a present object.

Judgement is another power naturally founded in sensation. For, to compare two sensations together, to glide insensibly into a belief that they are compatible or incompatible in the same subject, are as necessary consequences of having formed the sensation, as the sensations were the consequences of the brain's having been affected by the impression. Thus, if you present a red rose to a child who never has seen one before, but who has seen a white rose, it has immediately the complete sensation of a red rose; and if it can speak it will express a judgement and belief that it is a red rose. This is the birth of judgment.

The power of reasoning, in like manner, grows out of sensation. For, let a youth, after some experience of the properties of things, be supposed master of two distinct independant perceptions, but not to have experienced enough to incline him to a belief

that they are naturally and properly compatible in the same object: what resource has he? he naturally, and if the determination interests him, immediately recollects a known third perception, with which one of the two sensations is known, from experience, to agree; and with this third perception recollected, he is insensibly drawn to compare the other perception.

Let it be enquired, Will the eating of the berries of the deadly night-shade kill me? I run back to some conception, allied to the question; as, that these berries poisoned one of my neighbours. I know that I am of the same nature with that neighbour; therefore, as the berries poisoned my neighbour, and I am of the same nature with him, I conclude, that they will kill me; I believe it as a matter of experience.

In the same manner might we trace fancy,

the power of abstraction, and the power of classing things to their origin from actual sensation, but that is at present declined; and I would only remark, that all intellectual powers whatever, depend as much on the brain for their exertion, as simple sensation does: for, living systems furnished with no brain, discover as little reason, &c. as they do sense; and injuries done to the brain, of the nature of those enumerated above, while they hurt or suspend sense, hurt, suspend, or pervert the powers of memory, reason, judgment, &c.

Nay, in some cases of injury or disease of the brain, the powers of intellect are more deranged than those of pure sensation. Maniacs, in whom it has been proved that the brain is topically affected, and probably always in fault, are often exact in particular sensations, but err widely in judgment and reasoning. A sufferer, too, under the operation of the

trepan, is found sometimes possessing feeling, but erring in reason, and refers the whole operation, and all that is said and done, to some other person.

Superficial observation would conclude, that the idea of beauty, in general, is the result of reasoning, and not an innate sense, or not a sense which buds on the green stem of youth: arguing, that if it arose from a sense of the thing itself, all nations, and all individuals of the same nation, should agree in their conception of it, which they do not do; therefore, it must arise from a deduction of reason merely. I answer, that the sense of beauty is natural and untaught, though the object of it may differ among different men.

Sense of all kinds is more liable to bias, from custom, constitution, &c. than reason, which is the same all over the world. A putrid substance may be agreeable to some

nations, the aversion of others: yet a taste of putridity always arises, when putrid substances are eaten. However, keeping out of the human race, the sense of beauty is excited by similar objects, almost universally; the light of the morning, the setting sun, the flowers of the field, the birds of the air, fine colours, &c. are objects over all the world reckoned beautiful.

In the human race, the same forms are not so uniformly reckoned beautiful, because the sensibility to this beauty is far more delicate; and as the variety of human forms is endless, so there is in this instance a greater latitude in the sense itself. But did reason determine the matter, the agreement would be far greater than it is, since reason could be ascertained and communicated, and the qualities of beauty being classed, beauty might be exhibited as merchandize, and men might with precision and uniformity select it.

Beauty may be reasoned upon, and the forms, and colours, and magnitudes, and proportions of it determined, but mere reason, though it can ascertain the forms of beauty, and the usefulness of beauty, never suggests beauty, no more than it suggests the idea of colours, taste, &c.

All the internal senses also depend on the brain, and the perceptions which we cannot help receiving as we live, under the continual contact and impression of external things; these are naturally stems from which the various additional senses, called internal, branch off. We cannot hear sounds, agreeable in combination, without a sense of harmony; we cannot see the form of regularity of parts, and the colour, of most flowers, without believing them to be beautiful; nor understand the signs by which our fellow-creatures express or betray their feelings, without a belief that they in their turn comprehend our signs; nor

witness their actions without approving of some of them, and blaming others. This is the physical birth of the senses called internal, which seem to be peculiar to man; and they also depend on the brain.

For, not to dwell upon other instances, if the most delicate and chaste female be seized with a phrenitis, she loses her habitual sense of delicacy; and if injury or disease in the brain induces mania, the maniac ceases to feel the obligations of morality.

The distinction of sense into external and internal, does not go to discriminate the nature of the two sets of sense, for they are all equally internal and external. Nothing further can be understood than that the one set of internal senses is excited when external things affect the organs of sense; but the other does not immediately require the impression of external things to produce them.

Lastly, all the passions and appetites depend on the brain for their corporeal organ. Objects whose properties come home to us through the primary sensations, do not leave us in a state of indifference: the primary perceptions give birth to senses called internal, and the internal senses to appetites, passions, and volitions.

These depend upon the brain; not only because they grow out of sense, which depends on that organ, but because, when the brain is injured or diseased, it is found equally or more severely to alter, pervert, or extinguish passions and appetites.

In phrenitis no alteration is more remarkable than an alteration and disorder in the passions. This will appear from an unusual fear of imaginary evils, an unusual anxiety about their friends, and an unusual hatred against their enemies.

I once saw a phrenitic patient with Dr. Pitcairn; some of his senses were lost; taste in particular; but his regard for his wife was expressed in a tempest of passion; it was the rage of love: at other times he had the most delicate yet groundless jealousy.

Maniacs, in the exacerbation of their complaints, are preternaturally irascible, enraged, or furious; they go into fits of devotion with a fervour and religious awe, of which sound reason is hardly susceptible.

There is a remarkable peculiarity in the state of the power of the brain, observed as a law of the animal œconomy, which is, that the exertion is subjected to periodical suspension, more or less complete. This periodical suspension, is sleep. It is a complete suspension of the power of the five senses and of the action of voluntary muscles; for in sleep particular sensations do not occur. Neither

in sound sleep are the powers which grow out of sensations exerted. But in unquiet nights, though no actual sensation occurs, no immediate impression on any organ of a peculiar sense being perceived; the powers of memory, fancy, reason, and judgment, with various internal senses and passions are differently exerted.

The intellectual powers and passions exerted in sleep, proceed in an unusual way, not for want of reason, but from want of actual sensations, to correct wrong judgments, and to direct all these powers according to the reality of things.

The effect of sleep is to refresh and restore the powers of the brain and nerves; and independant of the sealing up of actual sensation, the muscular parts in themselves require periodical suspension or abatement of their energy. Long continued actual sensations, strong sensations, lasting but for a short time,

the suffering of moderate pain for a long time, or intense pain for a short time, much thinking, pursuing a long train of abstract reasoning, great exertions of memory, &c. gradually blunt the powers of the brain and nerves, and a cessation of actual sensation occurs: and if in this insensible state, other powers of the brain be exerted, their exertion is less fatiguing than when we are awake, because in sleep their exertion is not fixed nor regulated by attention, which is one of the most fatiguing powers of the brain.

In like manner, long continued muscular action of the voluntary muscles induces a sort of inability in them, and in sleep their energy is restored. On awakening, after a due length of time spent in sleep, all the powers of the brain, and the energy of the muscles are restored in a proper degree.

I cannot quit this part of the subject with-

out observing that all the powers proved to belong to the brain are equally peculiar in their nature. To be conscious of the figure of a circle, or the colour of a flower, is as refined and as wonderful a power as reasoning is: and though these powers to the vulgar belief are a necessary consequence of an impression on the organ of sense, they have as little resemblance to such impressions as reasoning in an abstract manner has.

There are yet two other questions which seem necessary for our present purpose to consider; and first, whether the brain, strictly so called, and the cerebellum, medulla spinalis, &c. possess equal sentient powers? No doubt can remain that they do, when we consider that injuries or disease, in whichever of these integrant portions of the whole mass they happen, equally occasion stupor and insensibility, or are accompsnied with violent exertions of the muscular powers. But of

course the muscular disorder is the most obvious when those parts are affected, which give origin to nerves that supply the involuntary muscles.

Also injuries or disease prove equally fatal, whether in the brain, cerebellum, medulla oblongata, or medulla spinalis. A man is killed by being shot through the head. The fiercest bull is instantly killed by thrusting a knife through between the first vertebra and posterior edge of the foramen magnum occipitis into the beginning of the medulla spinalis. An elephant is killed in the same manner. Robert Walker, a soldier, was killed by being shot through the cauda equina. Lastly, the equal sentient power of these different portions is evinced, by their giving origin to nerves of particular organs of sense. The brain gives nerves to the nose and eyes; the cerebellum nerves, to the skin, muscles of the face, and to the tongue and teeth. The

medulla oblongata nerves to the ear; the medulla spinalis gives nerves to the muscles and skin of most of the body.

The second question is whether the whole substance of the brain, cerebellum, &c. be equally sentient. The nerves proceed from the medullary parts, not from the cineritious. This continuity of substance compared with the effects of tying, dividing, or destroying nerves, renders it probable, that it is principally the medullary parts of the brain which are the origin of the power ascribed to it. The medullary substance of all the portions forms one continuous mass, is apparently fibrous, the fibres being incredibly minute, convolved in regular intricacy, apparently without beginning, and ending no where but in the extremities of nerves. The two hemispheres of the brain communicate by transverse medullary bands, and by the union of their crura; the medullary crura of cerebellum blend with the medullary crura of cerebrum, &c.

In the next place, in Haller's experiments on living animals, instituted to determine the different degree of sensibility of different parts of the body, it appeared that the victim to his inquiry, manifested, most palpably, tokens of pain, and fell into the most violent convulsions, when the medullary substance of the brain was pierced, or broken down; but that these symptoms were less considerable when the injury was confined to the cineritious substance.

Accidental injuries also seem to hurt or disorder sense, according as they extend their effects to the medullary substance. A blow on the upper part of the head does not stun so suddenly as a blow near the basis of the skull; the cineritious substance abounding in the upper part, the medullary being exterior in the basis of the encephalum.

If judgment may be formed from one or two cases, a fracture, with depression of the

os frontis, causes less stupor than a fracture with depression of the parietal bones—the anterior lobes of the brain being supported on the orbitar processes of the frontal bones: but the middle parts of the hemispheres gravitating on the whole medullary substance below, the compression must extend its influence to the whole. These ideas are also strengthened from the case of a soldier, who recovered after being shot through the fore part of the cranium; and from another, in whom a piece of the barrel of a gun was beat into the fissura magna Silvii, where it remained two days, without any violent symptom; being lodged chiefly in the cineritious substance.

From these circumstances it is concluded, that the medullary substance, at the origin of the nerves, is principally concerned in the functions ascribed to the brain; and if it would throw greater light on the subject, to determine the seat of the soul, we would al-

lege, that the whole medullary substance is that seat.

So much we have advanced, respecting the precise function of the brain. It is established, we hope, beyond all doubt, that the brain, so far as a corporeal organ is concerned, gives sensation, intellect, volition, appetite, and passion. Beyond these, its powers seem not to extend—as we shall endeavour to shew. By the brain man is rendered speculative, and capable of understanding, and at the same time, inclined to action; and thus he is fitted for the place he holds in the system of nature.

It is unnecessary, we presume, to guard the account given, by subjoining, that when we call the brain the sole organ of sensation, and of all the powers superadded to sensation; we only mean the sole corporeal organ: for reason and the testimony of God declare, that in man, there is an immaterial substance which has a

share in perception, thinking, and reasoning, &c.—a mind united with the brain. But an inquiry into the human soul is not within the design of this paper. In this account of the brain no mention is made of the soul, because it is only the corporeal organ of the powers explained, that we are considering. That there is a soul within us, as well as an omnipotent spirit, that fills, sustains, and actuates the universe, I firmly believe; and no less do I believe so from reason, than from the sacred monuments of divine inspiration. But it is to be observed, that in this state of our existence, no act of the mind can be, or ever is, exerted, without a corresponding condition of power in the brain. Brain and soul, though it is unknown how they are united to us, are joint agents in this world; the power and health of the former, in every exercise of sense, judgment, memory, passion, &c. is indispensibly necessary, and equally so with the presence of the mind.

Besides, the brain, and not the soul, is the proper object of medical or surgical treatment. Had we introduced the mind into our discussion, we must have thrown the brain into the back ground, or have encumbered the narration with a constant coupling of brain and mind.

HAVING proved, we hope, that the brain is the corporeal organ of sensation, and of all the powers which naturally grow out of sensation, we shall proceed to shew, that the brain seems to possess no other powers. The other powers supposed to belong to it are as follows: That the action and vigour of the muscles, denominated involuntary, such as those of the heart, intestines, arteries, and lymphatic vessels, depend on an energy derived from the brain. The following are some of the rea-

sons which induce us* to dissent from this opinion:

Involuntary contractility is evident in living systems, which have no brain; there are moving contractile fibres in plants, whose motions are the result of stimuli applied to them. The leaves of the hedysarum movens, rise and descend alternately by the stimulus of heat and light. In the mimosa pudica, the leaves are pennated, and upon the slightest touch, not only do their leaflets severally close, but the petioles, with a sudden adduction, close upon the stem.

The contractility of the muscipula dionæa is as remarkable as that of animals; upon the slightest touch, the thick leaves on the top of the stem contract suddenly, and with great

* Dr. M. uses the plural personal pronoun, to avoid speaking of himself. The reader will understand it to be his own phrase.—*Editor.*

force; and if the stimulus be urged, the approximation of the two opposite leaves is proportionally urged, without any relaxation, till the stimulus be removed. By this action it proves fatal to insects: if a fly alights on it, it immediately closes; and the more the fly struggles to get free, the faster it is held, until at length the intruder is killed. When the stimulus is removed the leaf relaxes.

Not to multiply instances of that which no one will dispute, one more fact may be cited, viz. That the descent of the succus proprius of plants, even in the warmest weather, is a proof that the fibres of the wood possess something like muscular contractility, by which the motion of the succus proprius is conducted, in a direction contrary to the law of capillary attraction. In short, the contractility of the fibres of vegetables, upon the application of suitable stimuli, is universal in the vegetable world; and the inference seems unavoidable, that contractility, at least in every respect

resembling muscular contractility, does in fact take place independent of brain.

As to animals without brain, it is admitted, that muscular contraction is almost their sole function; and this shows, that actual muscular contractility does, in some animals at least, exist without the aid of brain.

It would also appear, that in animals evidently furnished with brain, the power and functions of muscular parts precede the power and function of the brain, in order of time. The heart of an embryo chick may be perceived as a punctum saliens in its thorax, within the first two days of incubation, when the head is merely a shapeless mass, and the brain, in all probability, has no regular conformation, and likely no powers.

The same truth is more palpable in a fœtus in utero. Its heart and arteries act in a regu-

lar and powerful manner, the intestines contract, and secretions are performed: yet the brain, in this early stage of our existence, seems not to exert any power—sensation not being required in utero, the action of the brain is not yet established. That the uterine child sees not, nor hears, will probably be admitted; and it seems likely that the sense of feeling is not yet unfolded.

If sensation springs up in the first month of our existence, it is still in a most imperfect degree. If, then, a power incontrovertibly belonging to the brain, be not established in the fœtus, how can we believe that any other power, merely hypothetical, belongs to it in the fœtus? The conclusion seems obvious—that if growth and muscular motion are performed independently of the brain, in the uterine child, the same must, in all probability, be performed independently of the brain in the same constitution living in air.

When we turn our attention to beings like ourselves, after birth and after sense has been established, we find great reason to conclude, that the incontrovertible powers of the brain are more dependent on the power and action of the heart and arteries, than the power and action of involuntary muscular organs are supported by the brain. For, sensation, memory, and all the known powers of the brain cease immediately, when the action of the heart and arteries ceases; but the power and action of the heart and arteries continue for some time after the head is taken off, or all the nerves connecting the brain and heart are divided. In Syncope, all sense is suspended. But interrupting the communication between the brain and heart is not immediately an interruption to the action of the heart and arteries.

In toads, frogs, lizards, &c. the heart continues its action for hours after it is disjoined

from the brain. The same original independent power is conspicuous, though for a shorter time, in the involuntary muscles of animals resembling man in their œconomy. The heart of a dog, when cut out of the body, and of course separated from all connection with the brain, and laid on a table, continues to palpitate for some time. Senac relates, that he observed the action of a dog's heart, in such circumstances, 100 times, by touching it so often with his finger*.

* The following experiments made by Dr. Marshal, as far back as the year 1779, illustrate this subject so directly that the Editor cannot avoid citing them.

Jersey, November 1st, 1779. 10 o'Clock—weather temperate; I cut off the head of a toad. 11 Minutes past 10 o'clock—when laid upon his back, on pinching its skin with a pair of dissecting forceps, it collected its hind legs up to the belly, but left the fore limbs as they were accidentally placed. 20 Minutes past ten—the thorax being opened, the heart was beating at the rate of 48 strokes in a minute, and the hind legs moved strongly when the skin was pinched 28 Minutes past 10—the hind legs moved, but tremulously, towards the belly; pulse 36; head alive. 38 Minutes past 10—muscles

In like manner, a piece of healthy intestine, separated from a living body, constructed upon the same plan with our own, contracts,

of thigh contracted on applying salt to them; pulse 36. 12 Minutes past 11—pulsations 24; on pinching the skin hind legs contracted a little; no motion in fore legs; head almost dead. 10 Minutes past 12—no contraction of the legs when the skin was pinched; pulse 24; but made more frequent on pinching the intestines with the forceps. The body now exposed to the sun, the heart still receiving blood, appearing red when dilated, pale when contracted. 45 Minutes past 1—heart drying by the heat of the sun; beats 24; quickened, by laying salt on it, to 36. 40 Minutes past 3—dead.

Exper. II. I cut the spinal marrow, and all the nerves of the neck, of another toad. The head instantly dropped, and the creature sat squat, as if going to walk. In 12 minutes the knees of his hind legs bent so strong, as to support his own weight. 32 Minutes—contraction of hind legs strong; feeble in fore legs; head alive. One hour and 7 minutes after operation—contraction of hind legs; too feeble to support the weight; head dead; no power in fore legs. 3 Hours 2 minutes—no contraction in hind legs. On opening the thorax, the pulsation of heart was found to be 36. To see whether the heart contracted by habit, independent of the stimulus of the blood entering into it, a ligature was thrown round the great vessels entering the heart; immediately the heart became pale, and ceased to contract.

when laid on the table, as I have frequently seen.

The phenomena which mark the recovery of persons apparently drowned, seem to prove that the brain neither begins, nor sufficiently sustains muscular powers in parts denominated involuntary. The first sign of returning life is generally some motion about the heart or diaphragm; then more or less of respiration; and at length the person recovers sensation, and hears and sees what is passing*.

* The Editor has several times performed the following experiment in the presence of Dr. Marshal, which greatly interested him. It is a strong corroboration of Dr. Marshal's opinion respecting the pre-eminence of the heart and arteries over the brain.

Plunge a frog into pure carbonic gas, all signs of life will quickly vanish; expose the heart, and it will be found quiet, and full of dark blood; prick the heart with a needle, and it will contract; wait a little, and again prick it, and it will again contract. This mode of stimulating the heart must be repeated until it is found that the heart begins to contract without it, which will be very slowly at first: shortly respiration

Now what are we to conclude from these and innumerable other facts leading to the same purpose, but that the involuntary muscles derive not their power of acting from the brain? It is no refutation of this opinion, to answer, that sooner or later, the power and action of involuntary muscles cease for ever, when they are thus separated from the brain: their power and action must at length cease, because parts appointed to have powers in conjunction, are disjoined. Every part has its own health and power, yet the sufferings, or removal of one part, more or less affects the rest; and when all the parts of the body are

will be resumed, and soon the frog will open his eyes, turn upon his belly, and hop off. Sew up the wound in the thorax and it will soon heal, and the animal will enjoy good health.

The Editor cannot help here remarking, that in all instances of suspended animation, our views ought to be chiefly directed towards recovering the lost action of the heart; for, if the action of that organ be restored, respiration and every other function will thereby be recovered.

healthy, and in due power, the health and power of individual parts are more steadily supported.

As to parts, denominated vital, such as the brain, heart, and lungs, it is certain that the destruction of any one of them very soon is fatal to life. Therefore, it cannot be concluded that any one depends particularly on the others, more than the others do on it. Only as the action of the heart and arteries begins first, and remains for some time after the powers of the other have ceased, it may be inferred that the heart is the most independent in its action of all the parts specified.

The involuntary muscular parts are connected with the brain; not that by this means they may derive life and vigour from the brain, which itself is no more than a distinct living part, but that the injuries and disorders of the former may be felt by the

latter, which perception of injury or disease, as was previously shewn, is connected with the preservation of the animal. By other connecting media, as the being supplied with blood-vessels from the same great trunks, and the being supplied with the same animal heat, the involuntary muscular parts, and the brain, mutually support each other.

There seems to be reason to think that the power of involuntary muscles ceases sooner in man, on being separated from the brain, than in other animals: and if we may presume to conjecture what are the designs of Providence in making the systems as they are, we must conclude from the mass of evidence above submitted, not that the involuntary muscles depend on the brain for their energy, but that it is not the intention of our Maker to preserve life without brain; for man, for his own preservation depends more on his sense and reason than on any motion arising from

mere irritability, and as without the powers of the brain he would not be man, so without brain he exists not.

Further, it does not appear that the action of the voluntary muscles arises from an energy transmitted to them from the brain. Volition, which is unquestionably a power connected with the brain, and a power inseparable from consciousness of its exertion, cannot, without absurdity, be supposed to throw energy into muscles; it being a simple exertion of a single power of the brain; and an exertion completely finished in willing the end, for volition is never directed to particular muscles, (or if directed so it is in vain) but simply determines the end to be accomplished; and the whole set of muscles fitted to produce that effect, obey that will.

If volition directed the actions and the successive and simultaneous co-operative action

of the muscles, with a view to the direct effect, the time of action would be protracted; and before men could engage in those labours by which human life is at once sustained and adorned, they all would be obliged to study anatomy. But nature is wiser. Anatomists by willing and wishing merely the contraction of a particular muscle, cannot produce it any more than an untaught rustic.

Besides, if volition, which, ex hypothesi, is merely the willing an end, were also a conveyer of impulse to the nervous fluid, as supposed, it would be more than volition, and we should be conscious of the impulse and transmission of the motion.

That volition has no immediate concern with the energy of particular muscles, further appears from what happens when particular muscles in a living body are separated from the parts they move. They immediately con-

tract, in spite of volition; and though the nerves between them and the brain remain free, and the brain continues in full power, the muscles remain immoveable, at least no volition can move them. This fact was first noticed by Mr. Hunter, who cites the Gastrocnemii and solæi as an instance in the rupture of the tendo Achillis. This fact is however exactly of the same nature with the general one—that no volition can ever affect particular muscles in the first instance, and ought not to be otherwise explained.

Also, muscles reckoned voluntary, and usually brought into action by the power of the brain, though they derive not that power from it, often act without volition, and without our being conscious of even the effect of their action. In deep sleep, when neither sense nor memory is exerted, a person is often found lying on his side—a position to assume which requires the exertion and co-operation of mus-

cles, which on other occasions are exerted in their action with volition. Nor can an unperceived energy pass, in this case, from the brain into these muscles, because, ex hypothesi, the brain is totally at rest, exerting no power whatever.

A performer on the violin often acts with the muscles of the arm, hand, and fingers, in a swift regular succession and co-operation, hardly intending the end, but wholly taken up in the enjoyment of the harmony. Here, ex hypothesi, the brain is totally engaged in receiving pleasure from the sounds, and therefore cannot at the same time be employed in transmitting an impulse to the muscular parts, had it any to transmit. For the brain cannot exert two powers at one and the same instant. Not a point of time intervenes between volition and the exertion of the muscles; the volition and action seem to be syn-

chronous—so it cannot be said that the brain first wills, and then transmits the impulse.

Again, as muscles reckoned voluntary act sometimes without volition, and without consciousness, so they sometimes go into violent action, in spite of volition. In tetanus, and other spasmodic diseases, the patient retaining all his senses and reason, wills most heartily, the relaxation and usual measure of action of certain muscles; but volition is in vain. In such cases the contractility so excessive, cannot proceed from cerebral energy; otherwise two opposite powers would at the very same instant concur in the brain, a power of giving contraction, and a power of withdrawing the contractile energy; which is not less absurd than to say that when we will an end at that very instant we reject it.

According to the experiments of Haller,

during the contention and violent co-operation and convulsions of muscles reckoned voluntary, the nerves remain quiet and completely at rest, without tension or any alteration in their appearance, which would not be the case did they at this time transmit any expulsive substance from the brain to the muscles thus active. The violent action of these muscles would require corresponding motion in the substance of the nerves, if it were from nervous energy or from an influx of nervous fluid. The excessive torrents under such circumstances would disturb the rest of the nerves. If it is a subtile fluid, having no impulsive force, then we see no reason why its presence, any more than its absence, should move muscles and bring them into strong contractions; and if it has no manner of impulse, it is with great impropriety denominated a vis nervea, which implies operation, of which no proof can be given.

For these, and other reasons, we would submit, that the brain is not the efficient cause of muscular motion of any kind: that the energy of muscles is evident; but that it depends neither upon the energy of the brain, nor the vis nervea; for there is no energy in the brain, and no vis nervea of the nerves in the sense these terms have been taken in. The distribution of muscles into voluntary and involuntary, gives no illustration of their nature, since no exact limits can be fixed between voluntary and involuntary muscles—no objection however can be made to using the terms voluntary in respect of muscles, if no more be intended by the term than an energy of muscles accompanying volition.

CHAPTER II.

On the proximate Cause of Mania.

HAVING premised so much, from Dr. Marshal's notes, respecting the functions of the brain and nerves, the reader who feels the force and reason of the preceding observations will be prepared to believe that in all cases of derangement of the intellectual powers there will be an actual disease in the organ from which these powers proceed. This was the idea of Dr. Marshal; but before we proceed to state it, it will be necessary to remark, that it was also his opinion, that the original conformation of the brain is more or less perfect in different individuals. Dr. Marshal observes—

The human brain is very different in point

of organization, being more or less perfect in different individuals—perhaps it varies as much as other parts of the body. Where the structure is good, and permanently strong, there is strong health, and a powerful mind; and if there be a corresponding state in the other parts of the body, such individuals not only have the best mental abilities, if properly cultivated, but also live the longest, independent of accidents and certain diseases.

A dolt's brain is almost as deficient in conformation and structure, when compared to a justly formed one, as a crooked spine is to one of true shape; and as ill fitted to perform its functions.

That the structure of the brain, generally speaking, is altered in cases of mania, it is presumed Dr. Marshal has sufficiently proved in the cases already given—the instances are

too numerous, and the effects too palpable, to be considered as accidental; but by what morbid action this alteration in the structure of the brain, and consequent mental derangement are produced, is not to be demonstrated, but must be inferred.

Examinations after death do not shew us the real disease—they only discover to us its effects, for with death, the real disease, that active state of parts which produces the morbid alterations, ceases.

Dr. Marshal's opinion not only was, that the morbid changes which take place in the brains of maniacs is the immediate effect of diseased vascular action, but that the intellectual derangement which the malady exhibits is to be referred to the same cause.

With regard to the first of these opinions perhaps little need be said, as few will be in-

clined to doubt it. The water discovered, almost in all cases between the membranes, and in the cavities of the brain, is a morbid product flowing from diseased action of vessels. —The contracted and roughened state of the medulla oblongata and spinalis, evinces disease in the same parts.—The turgid state of the veins and sinuses, together with the absolute and demonstrable disease in the heart and arteries themselves, afford too abundant proof of disease in these parts to require illustration.

With regard to the second position, the mental derangement being occasioned by a diseased action in the vessels of the brain, Dr. M. observes, that it is the maniacal mode of action in the vessels of the brain which constitutes the proximate cause; and he remarks—

That, as every variation in the state of the

mind influences the action of the vessels of the brain, so, on the contrary, every variation in the action of the brain-vessels has a corresponding effect upon the mind.

For a free and moderate circulation of blood through the brain is accompanied by what is called a clear head. Dullness of ideas, and a stupid feel of the head, correspond with a languid circulation.

Thus certain states of the vessels of the brain will bring on mania; and by indulging in rage, envy, peevishness, &c. the action of these vessels may be so altered as to bring on, increase, or aggravate that disease.

But in the insane action in the vessels of the brain, there appears to be something different from mere increased action; the mode of action seems to be changed. Notwithstanding we must admit that increased vascu-

lar action alone will disorder intellect, as is evident in a variety of instances, as from violent exertion—the use of ardent spirits, &c.

In all instances of insanity, in delirium, in high symptomatic fever, in hydrocephalus, &c., it seems to be the morbid action of the vessels of the brain which constitutes the disease, and by which we are able, in any satisfactory way to account for the symptoms. This morbid action may be more or less transient; when accompanied with, or brought on, by general fever, the febrile action may go off, and the patient be left sane; or the febrile action may subside, and the maniacal, as it were, may be substituted, and the mania may be permanent.

Of phrenitis we may say the same. In this case the morbid vascular action not unfrequently produces such a complete alteration in

the structure of the brain as to end in incurable mania without fever.

These opinions receive additional strength from what is daily perceived from the effect of other diseases and medicines. Pure febrile action in the system induces false conceptions and monstrous ideas, which are not unfrequently followed by mania. Cancer of the face will sometimes cause confusion of thought, and loss of memory. Erysipelas, compound fractures, &c., in short, any high local inflammation, by altering the mode and degree of action of the heart, and arteries of the brain, will induce delirium.

In phthisis pulmonalis, where the heart and cerebral arteries are sound, the patient dies hard and slowly ; he indulges hope, and has spirits, long after the lungs are ulcerated, and flowing with pus, and almost all the flesh of

the body is wasted: he sleeps sound, and has a tolerably good pulse, excepting during the diurnal hectic periods.

But when together with the phthisis, the heart is diseased, the arteries of the brain thin, or ossified, the patient seldom drops asleep without bad dreams, and visions; and at times, when awake, he has delirium. When such a patient dies, water will be found in the ventricles of the brain, as well as in the chest, or pericardium.

But every symptom of the disease itself sufficiently indicates a morbid state of the vessels of the brain to be the cause. Most maniacs complain of severe pain and tightness of the head, especially in the beginning of the disease. When such patients are blooded, they generally request the surgeon to take a large quantity, for their heads are full of

blood. Also, most insane people are fond of spirits, but are easily made drunk; even small-beer will often produce that effect.

Certain direct modes of affecting the action of the heart and arteries by medicine will also produce an alteration in all the intellectual powers. A sufficient dose of opium, in the first instance, alters the action of the cerebral arteries, induces sleep, and light dreams, &c. The excitement is of such a sort, that the dreams are rather pleasant; but if the quantity be excessive, the action of the heart and vessels of the head is hurried, after a time languishes, and all sensation is destroyed. Cicuta, in like manner, by altering the action of the vessels of the head, induces stupor, giddiness, forgetfulness, &c.

In the use of strong fermented liquors we observe an immediate effect on the action of

the vessels of the head, destroying reason, stupifying sensation, perverting judgment, and causing boastings, rage, &c. In short, a man drunk is mad. There seems to be some difference according to what he is intoxicated with—for he is more preposterous, more obscene, and more imprudent when it is from pure ardent spirits, than when it is by fermented or vinous liquors. Bad wine gives a more savage drunkeness than good.

What is said of the pulse of old maniacs not being much affected, is true, to a certain degree, if we take the time of remission where they are subject to paroxysms; and is also true of such as have been for life-time idiots, or uniformly melancholy; or, in some cases, where there are lucid seasons, the pulse may seem to be acting in a healthy tenor, having become accustomed to the irritating cause. But the pulse, though it may not

beat frequent, may not be healthy in its mode of action; or, if healthy at the wrist, may not be so in the head.

The reality of such local irritation in the head is further proved when there is no unusual frequency of the pulse at the wrist, from persons having a sense of throbbing in the head—the feeling as of a nail drove through the temples—the sense of extreme cold in the sinciput, and other morbid conditions sometimes occurring; and yet the pulse shall be undisturbed in point of frequency.

CHAPTER III.

Marks of Disease not always apparent in the Brains of Maniacs after Death.

THOUGH Dr. Marshal's opinion was that the diseased vascular action which constitutes the disease called mania, affects the brain so materially, as generally to produce the morbid appearances and products already described; yet he was well aware that people might die of mania, under such circumstances that none of the proofs above mentioned could be found.

In such instances the morbid vascular action in the vessels of the brain, had not gone the length, either from the short duration of the disease, or some other cause, of produ-

cing the disorganisation. Some of the instances mentioned by Dr. M. are as follows:

A member of the university of Oxford fancying himself dead, laid himself on his bed, waiting to hear the bell toll on the occasion, which not being done, he became extremely enraged at this want of decency, got up, ran into the church, and began to toll it himself. Some one strongly urged to him the folly and absurdity of a man tolling his own passing-bell. He was so forcibly struck with the justness of the observation that he returned to his own house mente sanâ.

A servant girl in the country, happy in her situation, and liked by her master and mistress, one day while making a toast for the tea, was suddenly taken with a propensity to set fire to the barn-yard—instantly went out and committed the act, for which she was hanged.

In such instances as these, the person dying from an other disease not connected with the head, dissection most probably would discover no traces of insanity. The disease consisted in disordered action of the brain, which had not yet affected the structure. Hence, in the first instance, the strong remark that was addressed to the patient counteracted the newly-formed diseased action in the vessels of the brain, and restored the healthy action. For it must be admitted, that the mind acts upon the vessels of the brain, as well as the vessels of the brain upon the mind.

In the human brain, as in other organs, a cause having produced its effect, the effect often increases the susceptibility, and thereby the power of the cause becomes increased; in other words, a condition of parts more favourable to the operation of the cause is induced. In health it is so; for example, volition produces contraction in a muscle, and contrac-

tion increases its irritability, so that it is more readily excited to act afterwards.

So also in disease, a certain stimulus may excite too much muscular contraction, and this having once taken place, will increase the irritability of the muscle, so that on the same degree of stimulus being again applied, a still greater contraction will follow.

But in mania it may be observed, that any irritation of mind disorders the action of the vessels of the brain, and this disordered action induces a greater degree of susceptibility of mind.

As mania may begin in those who have an organisation of brain which gives a peculiar susceptibility to the disease, from an affront, from hearing a pathetic story, from disappointment in love, &c., it is probable that the brain in such instances, is not visibly al-

tered in the beginning of the attack: but the very exercise of the maniacal mode of thinking, in progress of time, irritates still more and more its vessels, and at length brings on a permanent disease in the organ. At the same time it is to be observed, that these slight exciting causes of mania only affect those who have brains highly susceptible to the disorder.

Mania also may not affect the primary functions of sensation, but the secondary, or internal senses; and the brain may be apparently sound. For instance, a woman of exquisite sensibility may have been so happy in the company of her lover, that after he is gone from her, perhaps for years, she, on the slightest hint of his name or person, may fancy him present, and talk irrationally about him. All this may take place without any thing more than diseased vascular action in the vessels of the brain; but if a renewal of

her tender feelings be frequent, the organ may become affected in its structure. This kind of mania, while it remains with an unaltered structure of brain, will be mild, and sometimes hardly apparent.

In cases where there is a great aptitude or susceptibility for mania, founded in a peculiarity of the structure or form of the brain, the disease will often arise from apparently slight causes, as sudden fright, excessive grief, or any undue exercise of body or mind, a hot climate, &c. These causes, as they may now be called, operate, as already explained, by altering the healthy mode of action in the vessels of the brain, and induce the malady. The insane mode of action may subside, without producing any visible alteration in the structure of the organ, and then the disease vanishes ; or it may continue until the structure is injured, which will very much tend to establish the disease.

CHAPTER IV.

On the predisponent and exciting Causes.*

PREDISPONENT CAUSE.

WITH regard to what has been called the predisponent cause of mania, this seems generally connected with a mal-conformation of the skull—the peculiar conformation of the brain necessarily attending this, gives to this organ a more than ordinary degree of susceptibility for the maniacal disease.

* Though Dr. Marshal in his manuscript notes uses the term predisponent cause; yet in his Lectures and conversation he cautiously avoided using the word predisposition, for fear of conveying to the young mind some erroneous ideas. He thought it a bad metaphor, and preferred using the words—a higher degree of aptitude, liability, or susceptibility, to express what is often in medical language called predisposition.—*Editor's note.*

Those who become insane generally have ill-formed heads. The skull is small, and too flat at the sides; the forehead is often narrow and prominent forwards. The fossæ in the basis of the skull are also often small; not leaving sufficient room for the basis of the brain and origin of the nerves.

Also a peculiar state of irritability in the cerebral arteries may render a person more highly susceptible to the disease. Perhaps this is the way in which the bad conformation of the head already mentioned tends to produce the disease.

It also seems to have passed in Dr. Marshal's mind, that the heart itself might be the foundation of the peculiar susceptibility to the disease—for he observes, that deformed persons most frequently become insane; and generally such have ill-formed and diseased hearts.

EXCITING CAUSE.

In many instances where there is this peculiar degree of susceptibility, arising from the mal-conformation of the brain already mentioned, the disease seems to be immediately produced by causes which appear not to be ambiguous—these causes are numerous.

Hot climates, injuries of the head, undue exercise of body and mind, sudden frights, excess of grief, indulgence of anger, pride, jealousy, &c. All these circumstances have in their turns acted as exciting causes of mania.

Also one disease sometimes becomes an exciting cause, as it were, of another: thus, injuries of the head, fever, inflammation of the brain, &c. sometimes act as exciting causes of mania.

CHAPTER V.

On the Varieties of Mania.

WHEN we consider the extent and variety of human intellect, the varied powers of the human mind arising out of the primary senses, we may form some conception of the varieties of mania.

The insane character is as various as the individuals affected. Their feelings and judgment are perverted, and their conceptions, though false, are multiplied. One maniac is distinguished for having a belief that the season of the year is farther advanced than his neighbour allows: in August he believes it is October, and acts accordingly. Another feels all England shake under his feet, and

looks and acts from a conviction of the fact. A chamber-maid looks affrightened; and why? the serpent is at her ear, prompting her to mischief which she abhors. A common man thinks himself the Prince of Wales, and calls the Duke of Douglas the father of the people; and these false impressions perhaps remain for life.

Some are ever shifting their ideas without acting upon any one. Mr. J——n set out to pay some money to Mr. H——, and returned with an impression that he had done so, though he had not. He happened to be in the Highgate stage, at a time the king was ill; he repeatedly asked every one in the coach if he was not glad that the king was better: notwithstanding which, he recollected trials which occurred in the courts of law for several years back circumstantially, and related them with much minuteness; but if a question was put to him while he was telling his story, he

could proceed no further with it, unless he began again.

Some conceive objects with unusual adjuncts, as a human hand in the air; others, form half, or imperfect conceptions and ideas, and imagine, for example, that they eat without having mouths, and follow in their minds a broken chain of unfinished conceits; not even common abstract ideas.

The vehement maniac forms strong, though imperfect conceptions; but before he comprehends the natural adjuncts, another, very slightly allied to the former, hurries his ideas away from the first, which again gives place to a third, with the same imperfect association; however, all their conceptions are somewhat connected, but the bond of union is unusual and very slight.

Again, others think erroneously, while they reason correctly and connectedly with the

usual associations. Their reasoning is correct, but it begins from false data, of which it is impossible to convince them. In such maniacs there is generally a great subtleness of reasoning.

Mania is evinced in some instances, if I might be allowed to express it so, by too lively an imagination, and judgment too great, but it is founded in error: they seem to soar above the subject; they see the truth—but something more. These kind of maniacs are remarkably shrewd in their observations, and often detect the fallacy of incorrect reasoning with great acuteness.

In the year 1789, when the king was ill, and the House of Commons was sitting, it was observed to Mr. S——e, a maniac, that the king was better, Mr. S——e, asked if the king had been to the House of Lords? being answered no; but that his speech had been delivered by the chancellor, Mr. S——e re-

plied—" that is impossible; if he was not at the house his speech could not be there; the king might send a message to the house, but not his speech." A group of maniacs being collected round a large fire, with a grating interposed between them and the fire, one of them exclaimed—" we are like monkies basking in the sun."

When mania comes on suddenly, as when induced from a brain-fever, or some such cause, a misconception will sometimes happen from an impression in his mind, that he is ever in the place where he first lost his senses. A captain of an East India ship having been attacked with a fever while at Madagascar, which ended in mania, ever after conceived himself in that place. When he was brought to London he still fancied himself in that part of the country, and whatever he saw was a model of what was in London. When he was shewn the Royal Exchange, he exclaimed

—" how like London! if I was not at Madagascar I should think myself at the Royal Exchange." When brought to St. Paul's—" the very model of St. Paul's London!" was his observation.

Some people seem to be insane upon one subject only, whilst they are rational upon every other ;—a remarkable instance of which occurred to Mr. P————n, near Norwich. The maniac persisted that he never ate any food; though it appeared that he had an appetite, he would not be seen eating on any account. That he might be induced to eat, the victuals were given to him with a request that he would give them to a poor starved cat; —he then took them to a place of secrecy, ate the food, and returned, saying he had disposed of the victuals.

Though love for our fellow-creatures is not one of the least amiable qualities of the human

heart, yet that is sometimes one of the most prominent characters of insanity. A person weakened by disease, or reduced by grief, will often love his friends too tenderly—cry without reason, and have unreasonable solicitudes about them.

Memory generally fails the mad, excepting as to the immediate cause of the disease—and that alone will sometimes occupy their thoughts. In some few instances however the circumstance which produced the mental derangement will be forgotten, while the memory will recognise some of the previous occurrences. For instance, an officer shall go mad from a quarrel with his superior, and entirely forget the quarrel, yet recollect a variety of circumstances which led to it.

There is a species of insanity which goes

under the name of lunacy. Such persons generally, in the early part of their life, are at times particularly lively; or have some odd way of living or conversing; perhaps retire into solitude without any good reason; laugh beyond the joke; admire or dislike too ardently; change their business without a good reason; or become fanatical, or wildly profane.

At length for some insufficient reason, as for the fear of want, though they may be very rich; for the fear of eternal damnation, though guilty of no crime, &c.; the lunatics destroy themselves—one by cutting his throat, another by hanging himself, and a third by throwing himself into the New River, &c.

In such instances the reasoning faculties of the lunatic are not much disordered; but he is wrong upon some wild point of belief.

To the last he is more or less fit for business; and when he determines upon suicide it is often so well planned and contrived as to receive no interruption in accomplishing the purpose.

CHAPTER VI.

On the maniacal Character, Deportment, and Ravings.

FEW maniacs are furious, and those who are, are only affected so occasionally; most of them are quiet, having either some erroneous judgment, or some depraved disposition.

The moral feelings of the insane are various —some are highly immoral, wicked, and mischievous; others are conscientiously good. Some are very happy; whilst others are miserable—far beyond common misery.

They are all obedient to coercion, and may be over-awed or managed. They may be taught to behave well; and what is most re-

markable, to conceal their own tendencies, and to imitate sense.

Coercion, where it is absolutely necessary, only does good so far as it moderates or prevents the paroxysms, which have a tendency to increase the susceptibility, and hence aggravate the disease.

The confines of mania, and soundness of mind, are hardly to be determined. It is, perhaps, impossible to say where the one begins and the other ends. Yet it is evident that there is a great number of insane characters at large in society, and even without doing harm. For, even most of the insane have a susceptibility of heart and love of life —hence they are influenced by the known habits of society, and are somewhat kept in check by the threats of the law. However, such persons are so far dangerous, that they are always liable to become more violently

affected upon the occurrence of a fresh exciting cause.

The deportment of maniacs is generally governed by their previous habits of life and business. A quondam captain is decently dressed, and bows when he salutes you;—the waggon-driver is more slovenly in his dress, and rough in his demeanour;—a newly married man will rave about his wife;—a soldier of his duty, &c.

If mania arises from too ardent an exercise of the brain, in any certain train, or upon any certain subject, then the mania seems to be directed in that course.

FINIS.

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Printed by E. Blackader, Took's Court, Chancery Lane,